(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 424 469 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
24.09.1997 Bulletin 1997/39

(21) Application number: **89909061.7**

(22) Date of filing: **10.07.1989**

(51) Int Cl.6: **H04N 7/087**, H04N 7/04, G11B 27/02, H04H 1/00

(86) International application number:
PCT/US89/02927

(87) International publication number:
WO 90/00847 (25.01.1990 Gazette 1990/03)

(54) **SYSTEM AND PROCESS FOR VCR SCHEDULING**

SYSTEM UND VERFAHREN ZUR PROGRAMMIERUNG EINES VCR

SYSTEME ET PROCEDE DE PROGRAMMATION D'UN MAGNETOSCOPE A CARTOUCHE

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(30) Priority: **15.07.1988 US 219971**

(43) Date of publication of application:
02.05.1991 Bulletin 1991/18

(60) Divisional application: **96202494.9**

(73) Proprietor: **STARSIGHT TELECAST, INC.**
Palo Alto, California 94301 (US)

(72) Inventor: **YOUNG, Patrick**
San Mateo, CA 94403 (US)

(74) Representative:
Cross, Rupert Edward Blount et al
BOULT WADE TENNANT,
27 Furnival Street
London EC4A 1PQ (GB)

(56) References cited:
WO-A-88/04507
GB-A- 2 185 670
US-A- 4 305 101
US-A- 4 821 102
DE-A- 3 621 263
GB-A- 2 207 314
US-A- 4 706 121

EP 0 424 469 B1

Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention further relates generally to a system and process in which television supplemental data is embedded in a televised broadcast and, on cue, the viewer can store the supplemental data. Such supplemental data can include schedule information, such as time, channel, program name and program type. The stored data is used to program a VCR automatically for recording a supplemental televised program as defined by the schedule information.

2. Description of the Prior Art:

The above-referenced related patent describes a system and process which allows user selection of broadcast programs from schedule information for presentation to a television set and/or recording by a VCR. The prior art discussed in that patent and of record in its application shows a variety of systems and processes for increasing the functionality of a television set and/or a VCR.

While a number of such systems and processes are known in the art, see for instance WO-A-8 804 507 and GB-A-2 207 314, none of these systems and processes deal with a way to provide supplemental information about material being broadcast to a viewer. An example of such supplemental information that would be of substantial interest to certain viewers is further information on a product that is advertised during a regular broadcast. Such commercial time is very expensive, particularly during prime time or televised sporting events with very large audiences, so that commercials have a typical length of from 30 seconds to one minute. For many advertised products, viewers need more information than can be provided during the commercials on, for example, features, prices and local availability before they make a decision to purchase the product. The ability to provide such supplemental information selectively to viewers who desire it would be of substantial value to advertisers and other suppliers of televised information.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a system and process which will allow a viewer to select interactively to receive supplemental information related to material in a television broadcast.

It is another object of the invention to provide such a system and process which will provide the supplemental information for recording when broadcast time is inexpensive.

It is a further object of the invention to provide such a system and process which will allow viewers to select supplemental information from a menu.

It is another object of the invention to provide a VCR schedule controller that provides an improved index of recorded material on a tape.

The attainment of these and related objects may be achieved through use of the novel system and process for provided in accordance with claims 1, 10 and 18. A system and process for VCR scheduling in accordance with this invention has a recording device, a broadcast receiver and a data processor connected to the recording device and to the broadcast receiver. The data processor includes means for presenting a cue on the broadcast receiver during the broadcast. A means is connected to the data processor for receiving a user response to the cue. A means responsive to the user response to the cue controls the recording device to record the supplemental information.

A process for presenting supplemental information about a broadcast in accordance with the invention includes providing a cue during a broadcast indicating the availability of supplemental information relating to the broadcast. A response to the cue is received from the user. The supplemental information is supplied to the user after receiving the cue response from the user. Preferably, the supplemental information is broadcast at a later time. Schedule information for the supplemental information is provided with the broadcast. The schedule information is stored after the user response to the cue and used to record the supplemental information with a recording device when the supplemental information is broadcast.

This apparatus allows supplemental information to be delivered to the viewer selectively, at a time that is beneficial and convenient for broadcasters, and retrieved by the viewer in a prompt and convenient way. One method of sending supplemental data is using the video blanking interval (VBI) segment of the video signal to carry teletext-formatted data. A teletext receiver-based apparatus is used to decode the supplemental data.

The cue may be a caption on the screen, an audio signal or message, an indicator on the apparatus, or anything that can alert the viewer. The cue may be generated selectively by the apparatus, based on the content of the supplemental data received, or the cue may be contained in the normal televised video picture or sound. The viewer responds to the cue by pushing a key on a remote controller, by a switch on the apparatus, by making a loud sound, or by any other means that will activate the system to store the supplemental data in memory.

When the viewer successfully stores the data on cue, the system may issue an acknowledgement. This may be another caption, an audio signal or message, or anything else to inform the viewer that the response to the cue has been entered. The system will then automatically tune the VCR to the scheduled channel and time defined by the supplemental data.

The attainment of the foregoing and related objects,

advantages and features of the invention should be more readily apparent to those skilled in the art, after review of the following more detailed description of the invention, taken together with the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a system for VCR scheduling in accordance with the invention.

Figure 2 is a block diagram of another system for VCR scheduling in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings, more particularly to Figure 1, there is shown a block diagram of an integrated VCR schedule controller in accordance with the invention. In this embodiment, the controller is provided built into a VCR, but it can also be provided separate from the VCR, such as by using the remote facility of the VCR to provide inputs to the VCR.

Broadcast data is received over antenna 1 or cable 2 by a programmable tuner 3, which has an output connected to input 14 of a teletext receiver 4. The teletext receiver may be a Sears Caption Decoder. The output of the teletext receiver 4 is connected to a microprocessor 5. Microprocessor output 11 is connected to a video display generator 10, used to create text for television receiver 60. Video switcher 15 connects the display generator 10 output 17 to the TV receiver 60 to display a message from the microprocessor 5.

The microprocessor 5 has a random access memory 9 and a system clock/calendar 6. After processing the embedded data, the microprocessor 5 generates a cue by outputting a symbol or message to the display generator 10 for display on TV receiver 60. Remote control receiver 20 receives a command from a remote controller 22 from a viewer input in response to the cue. Remote control receiver 20 is connected to an input line 21 and supplies a control signal to cause the microprocessor to store the embedded data in memory 9. The microprocessor then issues a message to the display generator 10 as an acknowledgement of the viewer input.

The cue can be implemented in many ways other than through the microprocessor 5. The simplest is an audio or visual stimulus that is part of the sound or video portion of the broadcast. In this case, both the display generator 10 and the video switcher 15 are unnecessary. The provision of the cue separate from the sound or video portion of the broadcast, such as in the VBI, which is then added to the sound or video portion of the signal provided to the TV receiver 60 by the microprocessor, is not distracting to viewers without the system of this invention.

The microprocessor 5 monitors the system clock 6 and compares it with the stored schedules from the embedded supplemental data. When the system time corresponds to one of the scheduled times, the microprocessor 5 sets the programmable tuner 3 to the stored channel and initiates recording on VCR 30 by a control signal on line 32. The VCR receives its signal from antenna 35 or cable 36.

In addition to obtaining schedule information as part of a broadcast, in a system 90 as shown in Figure 2, the schedule information can be received by a computer 5 using a modem 94 and processed by the computer 5. Based on user selections, one or more program schedule listings is stored in computer memory. At the time of the broadcasts, the computer 5 activates a VCR 30 for recording of the selected programs. Serial output port 32 of the computer 5 connects to a control bus of the VCR 30 to turn on the VCR, control channel selection and enable recording of the program.

The system 90 incorporates a feature for automatically converting television guide station listings to channel selections for cable users. To eliminate need to convert station listings to local channel numbers each time the VCR 30 is to be programmed for unattended recording, a memory is provided so that the user only needs to enter the conversion once. After that, the conversion is handled by the computer 5. An entry table is provided on-screen requesting the user to enter a cable channel number corresponding to each station name or number. Alternatively, both the station name or number and the cable number may be read from a bar-code conversion guide, using a bar-code reader. In either method, the conversion data is stored in a table in memory. During unattended recording, the channel number corresponding to the station name is used by the computer 5 to control channel selection on the VCR 30. With such a conversion stored locally in the system 90, cable schedule information can be supplied under cable channel names (e.g., ESPN) on a regional or national basis and selection of the appropriate local channel number for that cable service made by the controller 90.

The system 90 uses electronic indexing for automatic retrieval of programs. During recording, the location of the program is identified by a capstan counter with a digital readout. This index information identifying where a program to be recorded is stored into a log along with the name of the program. During playback, the VCR 30 will automatically go to the indexed location and start playback.

Line 101 from the VCR 30 is a serial bus containing the index data. It is connected to a serial input port of the computer 5. Search is made by comparing the present index value and the stored index value. Search is completed when the index value from the VCR 30 matches the stored index value.

The system 90 also provides self-indexed cassette recordings. At the start of each cassette tape, a complete description of the start and end positions of every program recorded on the cassette is stored along with the program names. During playback, this information is read by the teletext decoder of the VCR 30 and presented on the screen, allowing the user to identify quick-

ly what is recorded and to access the desired program automatically. Access is made by name selection from the log.

During recording, a complete log is created for each tape as described above. Before the tape is removed from the VCR 30, the tape is rewound to the start, and the log information is recorded onto video blanking interval (VBI) tracks of the tape using a VBI data encoder 110 of the type described in my above-referenced issued patent. Line 102 is a serial output from the computer 5 to the VBI encoder 110 and line 103 is the video signal with the embedded log information connecting to the video input port of the VCR 30. While the log information is recorded, the VCR 30 receives its signals from the antenna input 35 to the video input.

During playback, a VBI teletext decoder 108 receives data from the VCR on line 107, which is the video output port of VCR 30. After decoding, the data is received on line 106 by computer 5 on a second input port. Other than as shown and described, the construction and operation of the Figure 2 embodiment of the invention is the same as that of the Figure 1 embodiment.

Further details on implementing systems of this invention are available in my above-referenced issued patent.

It should now be apparent to those skilled in the art that a novel VCR schedule system and process capable of achieving the stated objects of the invention has been provided. The system and process allows interactive selection by a viewer of further information related to information being broadcast, which may be made with a menu selection. The further information can be broadcast for recording by a viewer at a different time, when broadcast time is less costly and/or underutilized.

It should further be apparent to those skilled in the art that various changes in form and details of the invention as shown and described may be made within the scope of the claims appended hereto.

Claims

1. A system to allow interactive selection for presentation to a user of supplemental broadcast information pertaining to a primary broadcast, the system comprising a recording device (30), a broadcast receiver (60), a data processor (5) connected to said recording device (30) and to said broadcast receiver (60), characterized in that the system is to allow interactive selection for presentation to a user of supplemental broadcast information pertaining to a primary broadcast in which a cue is broadcast at a first time with, and in addition to, a program comprising the primary broadcast, the system being characterized by said data processor including means responsive to the cue for presenting the cue on the broadcast receiver (60) during and simultaneous with presenting the primary broadcast on the receiver (60), the cue indicating the availability at a second time later than the first time of the supplemental broadcast information; means (20) connected to the data processor for receiving a user response to the cue, and means (6, 5, 32) responsive to the received cue response for controlling said recording device (30) to record the supplemental broadcast information at the second time.

2. The system of claim 1 in which schedule information for the supplemental broadcast information is provided with the primary broadcast, the system being characterized in that said data processor (5) is configured to store the schedule information in response to the received cue response and to use the schedule information to record the supplemental broadcast information with said recording device (30) when the supplemental broadcast information is broadcast.

3. The system of claim 2 further characterized in that said recording device (30) is a video cassette recorder and said broadcast receiver (60) is a television set.

4. The system of claim 1 further characterized in that said data processor (5, 10) is configured to provide acknowledgement to the user of the received cue response.

5. The system of claim 1 further characterized in that said data processor (5, 10) is configured to provide a menu display to the user in response to the received cue response and to receive user menu selections.

6. The system of claim 1 further characterized in that said system includes means (5, 9, 30) for creating and storing an index of recorded material.

7. The system of claim 6 further characterized in that ~~said system includes means (5, 9, 30) for recording~~ the index on a tape including the recorded material.

8. The system of claim 1 additionally comprising a memory (9) coupled to said data processor (5), said data processor (5) being configured to store information identifying a local channel number on which a cable channel is supplied in said memory (9).

9. The system of claim 1 in which the primary broadcast is an advertisement and the supplemental broadcast information is further details about the subject of the advertisement.

10. A process to allow interactive selection for presentation to a user of supplemental broadcast information pertaining to a primary broadcast in which a cue

9. Système selon la revendication 1, dans lequel la diffusion primaire est une diffusion publicitaire et l'information supplémentaire de diffusion représente d'autres détails concernant l'objet de la diffusion publicitaire.

10. Procédé destiné à permettre la sélection interactive pour une présentation à un utilisateur d'une information supplémentaire de diffusion appartenant à une diffusion primaire dans laquelle un caractère indicateur est diffusé pendant la diffusion primaire et en plus de celle-ci à un premier moment, le procédé comprenant les étapes suivantes : la réception du caractère indicateur et la présentation du caractère indicateur à l'utilisateur sur un récepteur de diffusion (60) pendant l'observation de la diffusion primaire et simultanément à cette observation, le caractère indicateur indiquant la disponibilité, à un second moment ultérieur au premier moment, de l'information supplémentaire de diffusion, la réception d'une réponse au caractère indicateur à partir de l'utilisateur, et la réaction à la réponse reçue au caractère indicateur pour la réception de l'information supplémentaire de diffusion au second moment.

11. Procédé selon la revendication 10, caractérisé en outre en ce que l'information de programmation provenant de l'information supplémentaire de diffusion est incorporée a la diffusion primaire, et l'étape de réaction à la réponse reçue au caractère indicateur comprend la mémorisation de l'information de programmation et l'utilisation de l'information de programmation pour l'enregistrement de l'information supplémentaire de diffusion avec un dispositif d'enregistrement lorsque l'information supplémentaire de diffusion est diffusée.

12. Procédé selon la revendication 10, caractérisé en outre par la transmission d'un accusé de réception de la réponse reçue au caractère indicateur, vers l'utilisateur.

13. Procédé selon la revendication 10, dans lequel l'étape de réaction à la réponse reçue au caractère indicateur comprend des étapes de formation d'un affichage d'un menu pour l'utilisateur à la suite de la réponse reçue au caractère indicateur, la réception des sélections dans le menu par l'utilisateur, et la réception de l'information supplémentaire de diffusion en fonction des sélections effectuées dans le menu par l'utilisateur.

14. Procédé selon la revendication 10, caractérisé en outre par la création et la mémorisation d'un index relatif à la matière enregistrée.

15. Procédé selon la revendication 14, caractérisé en outre par l'enregistrement de l'index sur une bande contenant la matière enregistrée.

16. Procédé selon la revendication 10, comprenant en outre les étapes de réception d'un signal d'entrée de l'utilisateur identifiant un numéro de canal local sur lequel un canal câblé est transmis et la mémorisation du numéro local sur lequel est transmis le canal câblé.

17. Procédé selon la revendication 10, dans lequel la diffusion est une diffusion publicitaire, et l'information supplémentaire donne des détails supplémentaires sur l'objet de la diffusion publicitaire.

18. Système destiné à permettre une sélection interactive pour la présentation à un utilisateur d'une information supplémentaire de diffusion appartenant à une diffusion primaire, le système comprenant un récepteur (60) de diffusion, et un processeur de données (5) connecté au dispositif d'enregistrement (30) et au récepteur de diffusion (60), caractérisé en ce que le système est destiné à permettre la sélection interactive pour une présentation à un utilisateur d'une information supplémentaire de diffusion appartenant à une première diffusion dans laquelle un caractère indicateur est diffusé à un premier moment avec un programme contenant la diffusion primaire et en plus de ce programme, le système étant caractérisé en ce que le processeur de données comporte un dispositif de présentation du caractère indicateur sur le récepteur de diffusion (60) pendant la présentation de la diffusion primaire sur le récepteur (60) et, simultanément à cette présentation, celle du caractère indicateur indiquant la disponibilité à un second moment ultérieur au premier moment de l'information supplémentaire de diffusion, un dispositif (20) connecté au processeur de données et destiné à recevoir une réponse de l'utilisateur au caractère indicateur, et un dispositif (6, 5) destiné à réagir à la réponse reçue au caractère indicateur pour la réception de l'information supplémentaire de diffusion au second moment.

is broadcast during and in addition to the primary broadcast at a first time, the process comprising the steps of: receiving the cue and presenting the cue to the user on a broadcast receiver (60) during, and simultaneous with showing of the primary broadcast, the cue indicating the availability at a second time later than the first time of the supplemental broadcast information; receiving a response to the cue from the user and reacting to the received cue response to receive the supplemental broadcast information at the second time.

11. The process of claim 10 further characterized in that schedule information for the supplemental broadcast information is provided with the primary broadcast, and the step of reacting to the received cue response comprises storing the schedule information and using the schedule information to record the supplemental broadcast information with a recording device when the supplemental broadcast information is broadcast.

12. The process of claim 10 further characterized by providing acknowledgement to the user of the received cue response.

13. The process of claim 10 wherein the step of reacting to the received cue response includes the steps of providing a menu display to the user in response to the received cue response, receiving user menu selections, and receiving the supplemental broadcast information in accordance with the user menu selections.

14. The process of claim 10 further characterized by creating and storing an index of recorded material.

15. The process of claim 14 further characterized by recording the index on a tape including the recorded material.

16. ~~The process of claim 10 additionally comprising the~~ steps of receiving a user input identifying a local channel number on which a cable channel is supplied and storing the local number on which a cable channel is supplied.

17. The process of claim 10 in which the broadcast is an advertisement and the supplemental information is further details about the subject of the advertisement.

18. A system to allow interactive selection for presentation to a user of supplemental broadcast information pertaining to a primary broadcast, the system comprising, a broadcast receiver (60), a data processor (5) connected to said recording device (30) and to said broadcast receiver (60), characterized in that the system is to allow interactive selection for presentation to a user of supplemental broadcast information pertaining to a primary broadcast in which a cue is broadcast at a first time with, and in addition to, a program comprising the primary broadcast; wherein said data processor including means for presenting the cue on the broadcast receiver (60) during and simultaneous with presenting the primary broadcast on the receiver (60), the cue indicating the availability at a second time later than the first time of the supplemental broadcast information; means (20) connected to the data processor for receiving a user response to the cue, and means (6, 5) for reacting to the received cue response to receive the supplemental broadcast information at the second time.

Patentansprüche

1. System, das einem Benutzer von Sendungszusatzinformation, die eine Primärsendung betrifft, eine interaktive Wahl zur Präsentation erlaubt, wobei das System aufweist eine Aufzeichnungsvorrichtung (30), einen Sendungsempfänger (60), einen Datenprozessor (5), der an die Aufzeichnungsvorrichtung (30) und den Sendungsempfänger (60) angeschlossen ist,
dadurch **gekennzeichnet**, daß das System eine interaktive Wahl zur Präsentation von Sendungzusatzinformation, die eine Primärsendung betrifft, an einen Benutzer erlaubt, wobei in der Primärsendung ein Hinweiszeichen zu einem ersten Zeitpunkt mit und zusätzlich zu einem Programm, das die Primärsendung umfaßt, gesendet wird, wobei das System dadurch **gekennzeichnet** ist, daß der Datenprozessor Mittel aufweist, die auf das Hinweiszeichen ansprechen, um das Hinweiszeichen am Sendungsempfänger (60) während und gleichzeitig mit der Präsentation der Primärsendung am Empfänger zu präsentieren, wobei das Hinweiszeichen die ~~Verfügbarkeit zu einem zweiten Zeitpunkt später als~~ der erste Zeitpunkt der Sendungszusatzinformation, anzeigt;
Mittel (20), die mit dem Datenprozessor verbunden sind, um eine Antwort des Benutzers auf das Hinweiszeichen zu empfangen und Mittel (6, 5, 32), die auf die empfangene Hinweiszeichenantwort ansprechen, um die Aufzeichnungsvorrichtung (30) zu steuern, damit diese die Sendungs-Zusatzinformation zum zweiten Zeitpunkt aufzeichnet.

2. System nach Anspruch 1,
wobei mit der Primärsendung Listeninformation für die Sendungszusatzinformation vorgesehen ist, und das System dadurch **gekennzeichnet** ist, daß der Datenprozessor (5) so ausgebildet ist, daß er die Listeninformation in Abhängigkeit von der emp-

fangenen Hinweiszeichenantwort speichert, und die Listeninformation dazu verwendet, die Sendungszusatzinformation mit der Aufzeichnungevorrichtung (30) aufzuzeichnen, wenn die Sendungszusatzinformation gesendet wird.

3. System nach Anspruch 2, weiterhin dadurch **gekennzeichnet**, daß die Aufzeichnungsvorrichtung (30) ein Videokassettenrekorder und der Sendungsempfänger (60) ein Fernsehgerät ist.

4. System nach Anspruch 1, weiterhin dadurch **gekennzeichnet**, daß der Datenprozessor (5, 10) so ausgebildet ist, daß er dem Benutzer die empfangene Hinweiszeichenantwort bestätigt.

5. System nach Anspruch 1, weiterhin dadurch **gekennzeichnet**, daß der Datenprozessor (5, 10) so ausgebildet ist, daß er dem Benutzer eine Menüanzeige als Antwort auf die empfangene Hinweiszeichenantwort bietet und die Menüwahl des Benutzers empfangen kann.

6. System nach Anspruch 1, weiterhin dadurch **gekennzeichnet**, daß das System Mittel (5, 9, 30) zum Erzeugen und Speichern eines Index des aufgezeichneten Materials aufweist.

7. System nach Anspruch 6, weiterhin dadurch **gekennzeichnet**, daß das System Mittel (5, 9, 30) zum Aufzeichnen des Index auf einem Band, das das aufgezeichnete Material enthält, aufweist.

8. System nach Anspruch 1, das zusätzlich einen Speicher (9) aufweist, der an den Datenprozessor (5) gekoppelt ist, wobei der Datenprozessor (5) so ausgebildet ist, daß er im Speicher (9) information speichert, die eine lokale Kanalnummer, auf der ein Kabelkanal zugeführt wird, identifiziert.

9. System nach Anspruch 1, in welchem die Primärsendung eine Werbung und die Sendungszusatzinformation weitere Details bezüglich des Werbungsgegenstandes sind.

10. Verfahren, das eine interaktive Wahl zur Präsentation einer Sendungszusatzinformation zu einer Primärsendung für den Benutzer erlaubt, wobei während und zusätzlich zu der Primärsendung zu einem ersten Zeitpunkt ein Hinweiszeichen gesendet wird, mit den Schritten:

Empfangen des Hinweiszeichens und Präsentieren des Hinweiszeichens dem Benutzer an dem Sendungsempfänger (60) während und gleichzeitig mit dem Zeigen der Primärsendung, wobei das Hinweiszeichen das zur Verfügung Stehen zu einem zweiten Zeitpunkt später als der erste Zeitpunkt der Sendungszusatzinformation anzeigt;
Empfangen einer Antwort auf das Hinweiszeichen vom Benutzer und Reagieren auf die empfangene Hinweiszeichenantwort, um die Sendungszusatzinformation zum zweiten Zeitpunkt zu empfangen.

11. Verfahren nach Anspruch 10, weiterhin **gekennzeichnet** durch das Schaffen der Listeninformation für die Sendungszusatzinformation, die mit der Primärsendung gegeben wird, und der Schritt Reagieren auf die empfangene Hinweiszeichenantwort ein Speichern der Listeninformation und Verwenden der Listeninformation zum Aufzeichnen der Sendungszusatzinformation mit einer Aufzeichnungsvorrichtung aufweist, wenn die Sendungszusatzinformation gesendet wird.

12. Verfahren nach Anspruch 10, weiterhin dadurch **gekennzeichnet**, daß für den Benutzer eine Bestätigung der empfangenen Hinweiszeichenantwort geschaffen wird.

13. Verfahren nach Anspruch 10, wobei der Schritt Reagieren auf die empfangene Hinweiszeichenantwort die Schritte Schaffen einer Menüanzeige für den Benutzer in Abhängigkeit von der empfangenen Hinweiszeichenantwort, Empfangen der Benutzer-Menüwahl und Empfangen der Sendungszusatzinformation in Übereinstimmung mit der Menüwahl des Benutzers, aufweist.

14. Verfahren nach Anspruch 10, weiterhin **gekennzeichnet** durch Erzeugen und Speichern eines Index des aufgezeichneten Materials.

15. Verfahren nach Anspruch 14, weiter **gekennzeichnet** durch Aufzeichnen des Index auf ein Band, das das aufgezeichnete Material enthält.

16. Verfahren nach Anspruch 10, zusätzlich mit den Schritten Empfangen der Eingabe des Benutzers, die eine lokale Kanalnummer, auf der ein Kabelkanal zugeführt wird, identifiziert und Speichern der lokalen Nummer, auf der ein Kabelkanal zugeführt wird.

17. Verfahren nach Anspruch 10, wobei die Sendung eine Werbung ist und die Zusatzinformation weitere Details über den Gegen-

stand der Werbung ist.

18. System, das einem Benutzer von Sendungszusatzinformation, die eine Primärsendung betrifft, eine interaktive Wahl zur Präsentation erlaubt, wobei das System aufweist einen Sendungsempfänger (60), einen Datenprozessor (5), der an die Aufzeichnungsvorrichtung (30) und den Sendungsempfänger (60) angeschlossen ist,
dadurch **gekennzeichnet**, daß das System eine interaktive Wahl zur Präsentation von Sendungszusatzinformation, die eine Primärsendung betrifft, an einen Benutzer erlaubt, wobei in der Primärsendung ein Hinweiszeichen zu einem ersten Zeitpunkt mit und zusätzlich zu einem Programm, das die Primärsendung umfaßt, gesendet wird, wobei das System
dadurch **gekennzeichnet** ist, daß der Datenprozessor Mittel aufweist, die das Hinweiszeichen am Sendungsempfänger (60) während und gleichzeitig mit dem Präsentieren der Primärsendung präsentieren, wobei das Hinweiszeichen die Verfügbarkeit zu einem zweiten Zeitpunkt später als der erste Zeitpunkt der Sendungzusatzinformation anzeigt; Mittel (20) an den Datenprozessor angeschlossen sind, um eine Benutzerantwort auf das Hinweiszeichen zu empfangen, und Mittel (6, 5) vorgesehen sind, um auf die empfangene Hinweiszeichenantwort zu reagieren, um die Sendungszusatzinformation zum zweiten Zeitpunkt zu empfangen.

Revendications

1. Système destiné à permettre une sélection interactive pour la présentation à un utilisateur d'une information supplémentaire relative à une diffusion et appartenant à une diffusion primaire, le système comprenant un dispositif d'enregistrement (30), un récepteur (60) de diffusion, et un processeur de données (5) connecté au dispositif d'enregistrement (30) et au récepteur de diffusion (60), caractérisé en ce que le système est destiné à permettre la sélection interactive pour la présentation à un utilisateur d'une information supplémentaire de diffusion appartenant à une diffusion primaire dans laquelle un caractère indicateur est diffusé à un premier moment avec un programme contenant la diffusion primaire et en plus de ce programme, le système étant caractérisé en ce que le processeur de données comporte un dispositif commandé par le caractère indicateur et destiné à présenter le caractère indicateur sur le récepteur de diffusion (60) pendant la diffusion primaire et simultanément à la présentation de la diffusion primaire sur le récepteur (60), le caractère indicateur indiquant la disponibilité, à un second moment ultérieur au premier moment, de l'information supplémentaire de diffusion, un dispositif (20) connecté au processeur de données et destiné à recevoir une réponse de l'utilisateur au caractère indicateur, et un dispositif (6, 5, 32) commandé par la réponse reçue au caractère indicateur et destiné à commander le dispositif d'enregistrement (30) pour enregistrer l'information supplémentaire de diffusion au second moment.

2. Système selon la revendication 1, dans lequel une information de programmation de l'information supplémentaire de diffusion est transmise avec la diffusion primaire, le système étant caractérisé en ce que le processeur de données (5) a une configuration lui permettant de mémoriser l'information de programmation à la suite de la réponse reçue au caractère indicateur et pour utiliser l'information de programmation pour l'enregistrement de l'information supplémentaire de diffusion avec le dispositif d'enregistrement (30) lorsque l'information supplémentaire de diffusion est diffusée.

3. Système selon la revendication 2, caractérisé en outre en ce que le dispositif d'enregistrement (30) est un magnétoscope à cassette et le récepteur de diffusion (60) est un poste de télévision.

4. Système selon la revendication 1, caractérisé en outre en ce que le processeur de données (5, 10) a une configuration donnant un accusé de réception à l'utilisateur et indiquant la réponse au caractère indicateur reçue.

5. Système selon la revendication 1, caractérisé en outre en ce que le processeur de données (5, 10) a une configuration donnant un affichage d'un menu à la disposition de l'utilisateur à la suite de la réponse reçue au caractère indicateur et pour la réception des sélections du menu à la disposition de l'utilisateur.

6. Système selon la revendication 1, caractérisé en ~~outre en ce que le système comporte un dispositif~~ (5, 9, 30) de création et de mémorisation d'un index sur la matière enregistrée.

7. Système selon la revendication 6, caractérisé en outre en ce que le système comporte un dispositif (5, 9, 30) pour l'enregistrement de l'index sur une bande comprenant la matière enregistrée.

8. Système selon la revendication 1, comprenant en outre une mémoire (9) couplée au processeur de données (5), le processeur de données (5) ayant une configuration lui permettant de mémoriser l'information identifiant un numéro local de canal sur lequel un canal de câble est transmis à la mémoire (9).

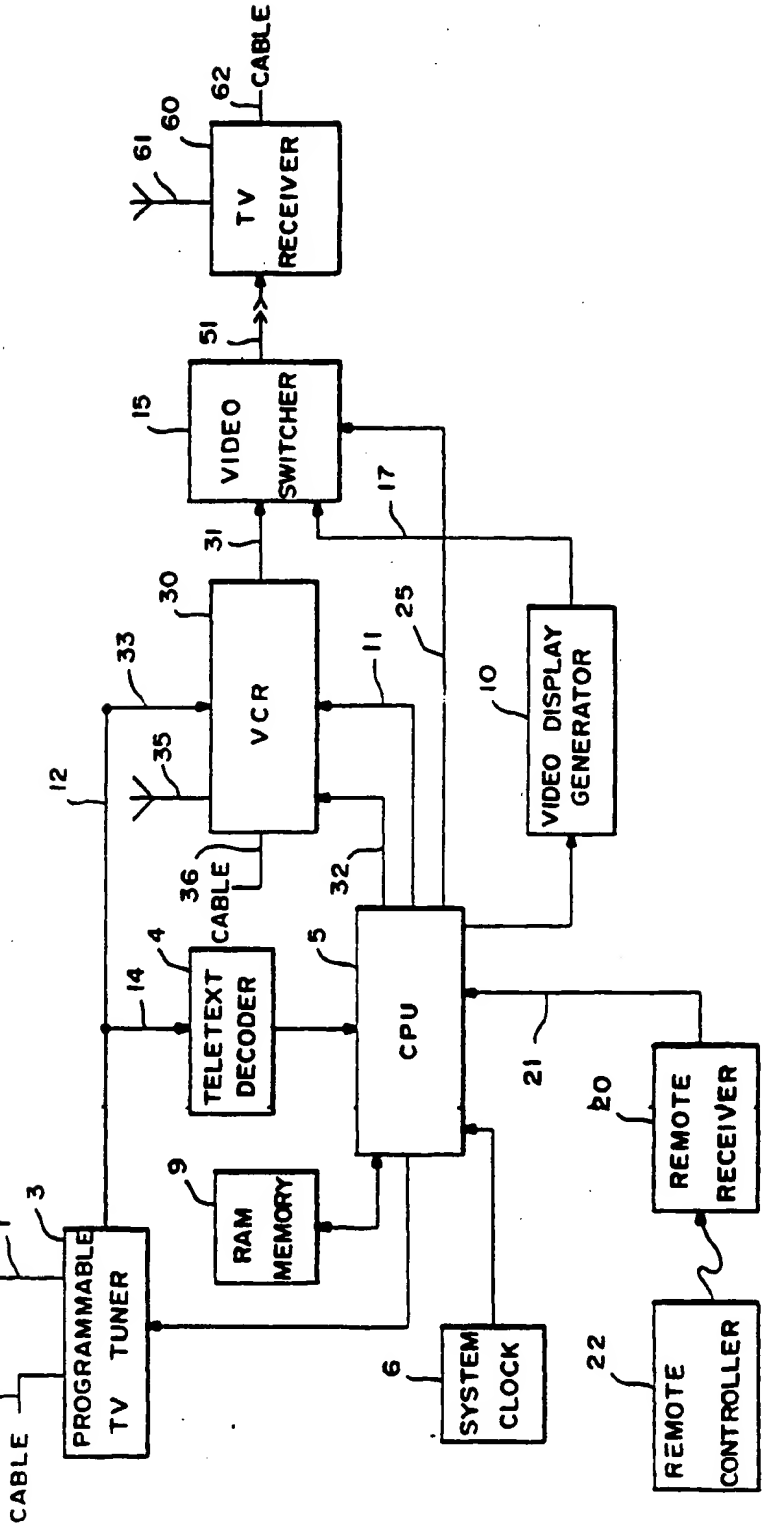
CABLE
2
1
3
PROGRAMMABLE TV TUNER
RAM MEMORY
9
TELETEXT DECODER
4
14
12
33
35
VCR
30
36
CABLE
31
VIDEO SWITCHER
15
51
TV RECEIVER
61
60
62
CABLE
17
25
11
32
CPU
5
6
SYSTEM CLOCK
VIDEO DISPLAY GENERATOR
10
21
20
REMOTE RECEIVER
22
REMOTE CONTROLLER

FIG.—1

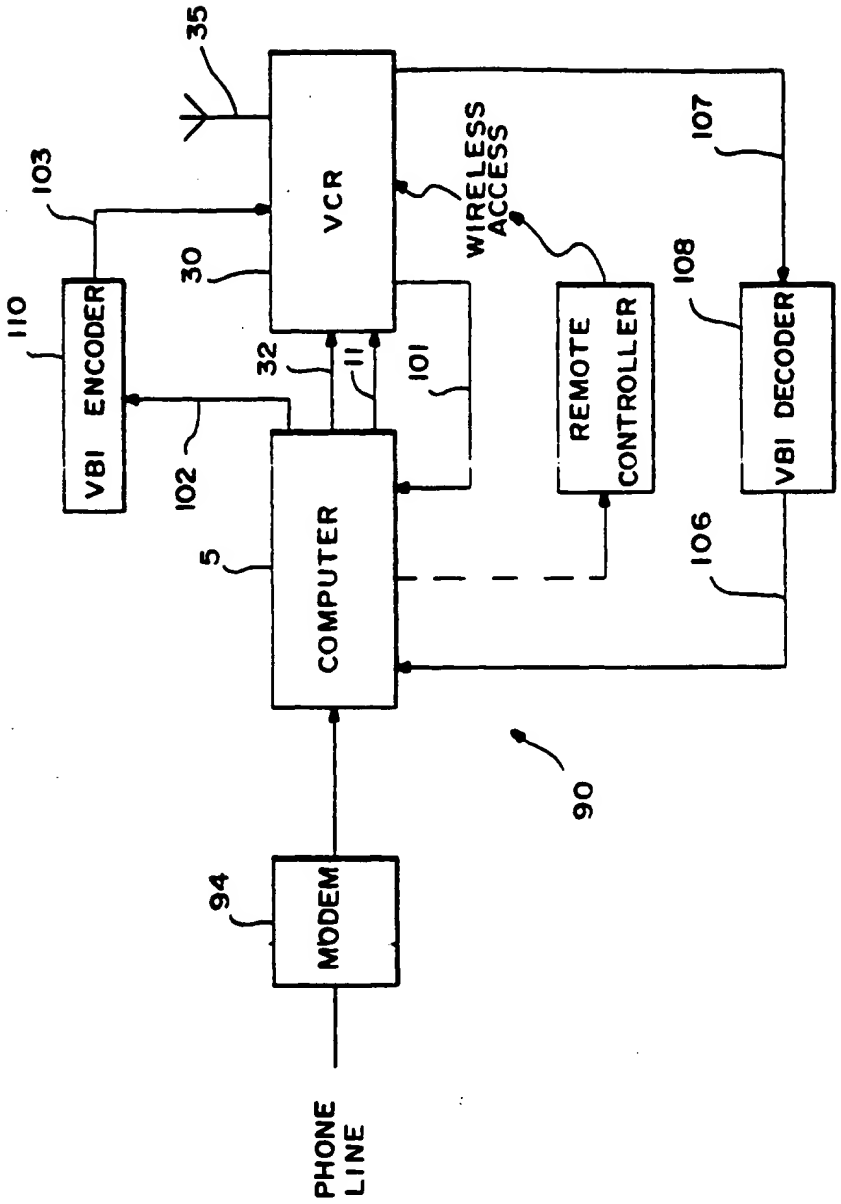
35
VCR
WIRELESS ACCESS
107
103
30
108
110
VBI ENCODER
REMOTE CONTROLLER
VBI DECODER
32
11
101
102
5
COMPUTER
106
90
94
MODEM
PHONE LINE

FIG.—2

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 449 985 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
21.01.1998 Bulletin 1998/04

(21) Application number: **90901995.2**

(22) Date of filing: **16.12.1989**

(51) Int Cl.6: **H04N 5/782**

(86) International application number:
PCT/US89/05806

(87) International publication number:
WO 90/07844 (12.07.1990 Gazette 1990/16)

(54) APPARATUS AND METHOD FOR USING ENCODED VIDEO RECORDER/PLAYER TIMER PREPROGRAMMING INFORMATION

VORRICHTUNG UND VERFAHREN ZUR VERWENDUNG VON KODIERTEN DATEN FÜR DIE ZEITVORPROGRAMMIERUNG EINES VIDEORECORDERS/VIDEOABSPIELERS

APPAREIL ET PROCEDE PERMETTANT D'UTILISER DES INFORMATIONS CODEES DE PREPROGRAMMATION PAR HORLOGE D'UN ENREGISTREUR/MAGNETOSCOPE VIDEO

(84) Designated Contracting States:
AT BE CH DE ES FR GB IT LI LU NL SE

(30) Priority: **23.12.1988 US 289369**
26.06.1989 US 371054

(43) Date of publication of application:
09.10.1991 Bulletin 1991/41

(73) Proprietor: **Gemstar Development Corporation**
Pasadena, California 91101 (US)

(72) Inventor: **Gemstar Development Corporation**
Pasadena, California 91101 (US)

(74) Representative:
Enskat, Michael Antony Frank et al
Saunders & Dolleymore,
9, Rickmansworth Road
Watford, Hertfordshire WD1 7HE (GB)

(56) References cited:
EP-A- 0 198 136
EP-A- 0 286 719
DE-A- 3 634 246
GB-A- 2 155 713
US-A- 4 475 153
US-A- 4 527 194
US-A- 4 623 887
US-A- 4 631 601
US-A- 4 755 883

- **FERNSEH- UND KINO-TECHNIK vol. 39, no. 6, June 1985, HEIDELBERG, DE pages 284 - 286 K. HARDER ET AL. 'Einfacher Generator zur Erzeugung der VPS-Sendedaten'**
- **PATENT ABSTRACTS OF JAPAN vol. 11, no. 35 (P-542)3 February 1987 & JP-A-61 204 741**
- **PATENT ABSTRACTS OF JAPAN vol. 12, no. 277 (E-640)30 July 1988 & JP-A-63 056 021**

EP 0 449 985 B1

Printed by Jouve, 75001 PARIS (FR)

Description

This invention relates generally to video cassette recorder systems and particularly to the timer preprogramming feature of video cassette recorders (VCRs) and to an apparatus and method for using encoded information to perform timer preprogramming.

The video cassette recorder (VCR) has a number of uses, including playing back of tapes filmed by a video camera, playing back of pre-recorded tapes, and recording and playing back of broadcast and cable television programmes.

To record a television programme in advance of viewing it, a two-step process is often used: (1) obtain the correct channel, date, time and length (CDTL) information from a television programme guide, and (2) program this CDTL information into the VCR. Depending on the model, year and type of the VCR, the CDTL information can be programmed in various ways including: (i) pushing an appropriate sequence of keys in the console according to instructions contained in the user's manual, (ii) pushing an appropriate sequence of keys in a remote handheld control unit according to instructions contained in the user's manual (remote programming), and (iii) executing a series of keystrokes in the remote handheld control unit in response to a menu displayed on the television screen (on-screen programming). Other techniques for timer preprogramming have been suggested including: (iv) reading in certain bar-code information using a light pen (light pen programming), and (v) entering instructions through a computer or telephone modem. These various methods differ only in the physical means of specifying the information while the contents, being CDTL and certain power/clock/timer on-off commands are generally common although the detailed protocol can vary with different model VCRs. Methods (i) and (ii) described above can require up to 100 keystrokes, which has inhibited the free use of the timer preprogramming feature of VCRs. To alleviate this, new VCR models have included an "On-Screen Programming" feature, which permits remote input of CDTL information in response to a menu displayed on the television screen. Generally on screen programming of CDTL information requires an average of about 18 keystrokes, which is less than some of the prior methods but still rather substantial. Some of the other techniques such as (iv) above, require the use of special equipment such as a bar-code reader.

In general the present state of the art suffers from a number of drawbacks. First, the procedure for setting the VCR to record in advance can be quite complex and confusing and difficult to learn; in fact, because of this many VCR owners shun using the timer preprogramming record feature. Second, the transcription of the CDTL information to the VCR is hardly ever error-free; in fact, many users of VCR's timer preprogramming features express concern over the high incidence of programming errors. Third, even for experienced users, the process of entering a lengthy sequence of information on the channel, date, time and length of desired program can become tedious. Fourth, techniques such as reading in bar-code information or using a computer require special equipment. These drawbacks have created a serious impedance in the use of a VCR as a recording device for television programs. The effect is that time shifting of programs has not become as popular as it once was thought it would be. Accordingly, there is a need in the art for a simpler system for effecting VCR timer preprogramming which will enable a user to take advantage of the recording feature of a VCR more fully and freely.

European Patent Specification EP-A-0 198 136 discloses an automatic digital electronic programming circuit which provides the entry of programme data to a VCR through use of a light pen to "swipe" across programme data in bar-code format. The disadvantage of this arrangement is that the additional equipment of a light pen and bar-code reader are required.

An object of the invention is to provide an improved system for the selection and entering of channel, date, time and length (CDTL) information by a user required for timer preprogramming of a VCR.

According to the present invention there is provided a system for automatically controlling recording by a video cassette recorder of a channel of video signals under control of a channel command beginning on the calendar day specified by a day command, at the time-of-day specified by a time-of-day command, and for the length of time specified by a length command, the system comprising: an input for receiving representations of coded indications, each representative of, the combination of one of each said channel command, day command, time-of-day command, and length command; and a decoder for decoding any said coded indication to individual channel command, day command, time-of-day command, and length command for control of the video cassette recorder, characterised in that the said coded indications received by the input are compressed in length before they are received by the input and in that the decoder expands said the compressed coded indications received.

According to the present invention there is further provided a method of programming a system for automatically controlling recording by a video cassette recorder of a channel of video signals specified by a channel command beginning at the time-of-day specified by a time-of-day command, on the calendar day specified by a day command and for the length of time specified by a length command, the steps comprising: receiving coded indications, each representative of the combination of one of each said channel command, day command, time-of-day command, and length command; and decoding any said coded indications to individual said channel command, day command, time-of-day command and length command for control of the video cassette controller, characterised in that the received coded indications are compressed coded indications and in that decoding step includes expanding said compressed

coded indications.

According to the present invention there is again provided a method of converting a television programme listing into a series of unique codes for combined visual selection of programmes for direct viewing and for use in automatic recording of programmes for future viewing, comprising the steps of: creating a day section and an associated unique day visual identifier for each of a plurality of calendar days; positioning in relation to each of the day sections the associated day visual identifier; creating a time-of-day section for each day section, for each of a plurality of television programme starting times and an associated unique time-of-day visual identifier; positioning in relation to each of the time-of-day sections the corresponding associated unique time-of-day visual identifier; creating a plurality of unique channel visual identifiers and a corresponding programme identifier for each such channel visual identifier, within each time-of-day section for such programme that starts at the time of such time-of-day section, and that is associated with the day section and time-of-day section within which it is positioned; creating a unique coded indication for each said programme, the coded indication representing the channel, the calendar day, the time-of-day, and the length of time for said programme; and positioning in a predetermined relation to each program identifier, the unique coded indication for each said program, characterised in that the step of creating each said coded indication comprises compressing the length of the coded indications normally required to program a video recorder.

According to the present invention there is still further provided the method of permitting a large number of programmes to be timer preprogrammed for recording by a video cassette recorder for time shifted viewing where the video cassette recorder can store only N timer preprogrammed programmes, the method being characterised by the steps of providing a remote controller having a means for keeping time; entering into said remote controller compressed codes each having at least one digit and each representative of, and compressed in length from, the combination of channel, time-of-day, day and length commands for a programme; and decoding each compressed code having at least one digit to channel, time-of-day, day and length commands; providing a memory; entering each said channel, time-of-day, day and length commands into said memory; reordering said channel, time-of-day, day and length commands in said memory into temporal order; and testing whether first N entries in said memory have changed and if yes, sending changed entries in first N entries to said video cassette recorder.

Systems and methods for automatically controlling VCRs and embodying the present invention, will now be provided, by way of example, with reference to the accompanying diagrammatic drawings, in which:

FIG. 1 is a schematic showing apparatus according to this invention with the code decoder means embedded in the video cassette recorder;
FIG. 2 is a schematic of the VCR embedded processors for command control and code decoding;
FIG. 3 is a schematic showing apparatus according to this invention with the code decoder means embedded in a remote controller;
FIG. 4 is a schematic of the processor embedded in the remote controller;
FIG. 5 is a schematic of a universal remote controller with the code decoder means embedded in the universal remote control;
FIG. 6 is a flow graph of the G-code decoding technique;
FIG. 7 is a flow graph of the G-code encoding technique;
FIG. 8 is an illustration of part of a television calendar according to this invention;
FIG. 9 is a flowchart for decoding the cable channels;
FIG. 10 is a flowchart for encoding the cable channels;
FIG. 11 is a flow graph of the G-code decoding for cable channels including conversion from assigned cable channel number to local cable carrier channel number;
FIG. 12 is a means for decoding including a stack memory;
FIG. 13 is a flowchart for program entry into stack memory; and
FIG. 14 is an operation flowchart for sending programs from remote control to main unit VCR.

In the drawings to be described, similar parts bear similar reference numerals.

Referring now to the drawings, and more particularly to FIG. 1, there is shown an apparatus for using encoded video recorder/player timer preprogramming information 10 according to this invention. The primary components include a remote controller 12 and a video cassette recorder/player with G-code decoder 14, which can be controlled by remote controller 12 via a command signal 16. The remote controller 12 can have a number of keys, which include numerical keys 20, G-code switch 22, function keys 24, program key 26 and power key 27. There are means in the remote controller 12 that interpret each key as it is pressed and send the proper command signal 16 to the VCR via an infra-red light emitting diode 28. Except for the G-code switch 22 on the remote controller 12 in FIG. 1, the remote controller 12 is essentially the same as any other remote controller in function. The G-code switch 22 is provided just to allow the user to lock the remote controller 12 in the G-code mode while using a G-code, which is the name given to the compressed code which is the encoded CDTL information, to perform timer preprogramming.

A G-code consists of 1 to 7 digits, although more could be used, and is associated with a particular program. A user would lockup the G-code in a program guide and just enter the G-code on the remote controller 12, instead of the present state of the art, which requires that the user enter the actual channel, date, time and length (CDTL) commands.

In order to understand the advantages of using a G-code, it is helpful to describe the best of the current state of the art, which is "on screen programming" with direct numerial entry. This technique involves about 18 keystrokes and the user has to keep switching his view back and forth between the TV screen and the remote controller while entering the CDTL information. This situation may be akin to a user having to dial an 18 digit telephone number while reading it from a phone book. The number of keys involved and the switching back and forth of the eye tend to induce errors. A typical keying sequence for timer recording using on-screen CDTL programming is as follows:

PROG 2 1 15 07 30 2 08 00 2 04 PR0G

The first program (PROG) key 26 enters the programming mode. Then a sequence of numericals key 20 are pushed. The 2 means it is timer recording rather than time setting. The 1 means the user is now entering the settings for program 1. The 15 is the date. The 07 is starting hour. The 30 is a starting minute. The 2 means pm. The next sequence 08 00 2 is the stopping time. The 04 is channel number. Finally, the PROG is hit again to exit the program mode.

By contrast, this command could have been "coded" and entered in a typical G-code sequence as follows: PROG 1138 PROG. To distinquish that the command is a coded G-code, the G-code switch 22 should be turned to the "ON" position. Instead of having a switch, a separate key "G" can be used. The G-code programming keystroke sequence would then be: G 1138 PROG.

The use of a G-code does not preclude "on-screen" confirmation of the program information that has been entered. When the keystrokes "PROG 1138 PROG" are entered with the G-code switch in the "ON" position, the G-code would be decoded and the television could display the following message:

PROGRAM	DATE	START TIME	STOP TIME	CHANNEL
1138	15	7:30 PM	8:00 PM	4

In order for the G-code to be useful it must be decoded and apparatus for that purpose must be provided. Referring to FIG. 1, a video cassette recorder/player with G-code decoder 14 is provided to be used in conjunction with remote controller 12. The command signal 16 sent from the remote controller 12 is sensed by the photodiode 32 and converted to electrical signals by command signal receiver 30. The electrical signals are sent to a command controller 36, which interprets the commands and determines how to respond to the commands. As shown in FIG. 1, it is also possible for the command controller 36 to receive commands from the manual controls 34 that are normally built into a VCR. Other possible command sources include voice if a speech recognizer is incorporated into the VCR and a bar code scanner. If the command controller 36 determines that a G-code was received then the G-code will be sent to the G-code decoder 38 for decoding. The G-code decoder 38 converts the G-code into CDTL information, which is used by the command controller 36 to set the time/channel programming 40. Built into the VCR is a clock 42. This is normally provided in a VCR and is used to keep track of the date and time. The clock 42 is used primarily by the time/channel programming 40 and the G-code decoder 38 functions. The time/channel programming 40 function is set up with CDTL information by the command controller 36. When the proper date and time is read from clock 42, then the time/channel programming 40 function turns the record/playback 44 function on to record. At the same time the tuner 46 is tuned to the proper channel in the television signal 18.

An alternate way to control the recorder is to have the command controller 36 keep all the CDTL information instead of sending it to the time/channel programming 40. The command controller would also keep track of the time by periodically reading clock 42. The command controller would then send commands to the time/channel programming 40 to turn on and off the recorder and to tuner 46 to cause it to tune to the right channel at the right time according to the CDTL information.

The clock 42 is also an input to G-code decoder 38, which allows the G-code decoding to be a function of the clock, which lends a measure of security to the decoding technique and makes it harder to copy. Of course this requires that the encoding technique must also be a function of the clock.

A possible realization of the command controller 36 and the G-code decoder 38 is shown in FIG. 2. The command controller 36 function can be realized with a microprocessor 50, a random access memory 52 and a read only memory 54, which is used for program storage. The input/output 56 function is adapted to receive commands from the command signal receiver 30, the manual controls 34 and the clock 42, and to output signals to a display 35, the clock 42, and the time/channel programming 40 function. If the microprocessor 50 interprets that a G-code has been received, then the G-code is sent to microcontroller 60 for decoding. The microcontroller 60 has an embedded random access memory 62 and an embedded read only memory 64 for program and table storage. The clock 42 can be read by both microprocessor 50 and microcontroller 60.

An alternative to having microcontroller 60 perform the G-code decoding is to build the G-code decoding directly

into the program stored in read only memory 54. This would eliminate the need for microcontroller 60. Of course, other hardware to perform the G-code decoding can also be used. The choice of which implementation to use is primarily an economic one.

The blocks in Figs. 1 and 2 are well known in the prior art and are present in the following patents: Fields, patent US-A-4,481,412; Scholz, patent US-A-4,519,003; and Brugliera, patent US-A-4,631,601. For example, clock 42 is analogous to element 7 in Scholz and element 17 in Brugliera. Other analogous elements are: command signal receiver 30 and Scholz 14 and Brugliera 12; tuner 46 and Scholz 6 and Brugliera 10; time/channel programming 40 and Scholz 8, 11 and Brugliera 16; record & playback 44 and Scholz 1, 2, 4; command controller 36 and Scholz 11, 10 and Brugliera 12; microprocessor 50 and Fields 27; RAM 62 and Fields 34; ROM 54 and Fields 33; manual controls 34 and Scholz 15, 16; and remote controller 12 and Scholz 26 and Brugliera 18.

FIG. 3 illustrates an alternate preferred embodiment of this invention. In FIG. 3 a remote controller with embedded G-code decoder 80 is provided. The remote controller with embedded G-code decoder 80 is very similar to remote controller 12, except for the addition of the G-code decoder 82. Note that it is also possible in any remote controller to provide a display 84. The remote controller with embedded G-code decoder 80 would be used in conjunction with a normal video cassette recorder/player 70, which would not be required to have an embedded G-code decoder. The numerals for the subelements of video cassette recorder/player 70 are the same as described above for the video cassette recorder/player with G-code decoder 14 and have the same function, except for the absence of G-code decoder 38. This preferred embodiment has the advantage that it can be used in conjunction with VCRs that are presently being used. These do not have a G-code decoding capability. Replacing their remote controllers with ones that have this capability built-in can vastly improve the capability to do timer preprogramming for a modest cost.

FIG. 4 illustrates a possible realization of the G-code decoder 82 built into the remote controller with embedded G-code decoder 80. A microprocessor 60 can be used as before to decode the G-code, as well as interface with the display 84, a clock 85, the keypad 88 and the light emitting diode 28. Alternately, other hardware implementations can be used to perform the G-code decoding. The clock is provided in the remote controller 80 so that the G-code decoder 82 can be made to have the clock as one of its inputs. This allows the G-code decoding to be a function of the clock, which lends a measure of security to the decoding technique and makes it harder to copy.

The remote controller with embedded G-code decoder as described above would send channel, date, time and length information to the video cassette recorder/player 70, which would use the CDTL information for tuning into the correct channel and starting and stopping the recording function. The remote controller may have to be unique for each different video cassette recorder/player, because each brand or model may have different infrared pulses for each type of information sent such as the channel number keys and start record and stop record keys. The particular infrared pulses used for each key type can be called the vocabulary of the particular remote controller. Each model may also have a different protocol or order of keys that need to be pushed to accomplish a function such as timer preprogramming. The protocol or order of keys to accomplish a function can be called sentence structure. If there is a unique remote controller built for each model type, then the proper vocabulary and sentence structure can be built directly into the remote controller.

An alternate to having the remote controller with embedded G-code decoder send channel, date, time and length information to the video cassette recorder/player 70, is to have the remote controller with embedded G-code decoder perform more operations to simplify the interfacing problem with existing video cassette recorder/players. In particular, if the remote controller not only performs the G-code decoding to CDTL, but also keeps track of time via clock 85, then it is possible for the remote controller to send just channel, start record and stop commands to the video cassette recorder/player. These are usually basic one key commands, which means there is no complicated protocol or sentence structure involved. Thus, to communicate with a diverse set of video cassette recorder/player models it is only necessary to have memory within the remote controller, such as ROM 64 of FIG. 4, for storing the vocabulary for all the models or at least a large subset. The G-code would be entered on the remote controller as before and decoded into channel, date, time and length information, which would be stored in the remote controller. Via clock 85, the time would be checked and when the correct time arrives the remote controller would automatically send out commands to the VCR unit for tuning to the correct channel and for starting and stopping the recording. It is estimated that only two (2) bytes per key for about 15 keys need to be stored for the vocabulary for each video cassette recorder/player model. Thus, to cover 50 models would only require about 30*50 = 1500 bytes of memory in the remote controller. It would be necessary to position the remote controller properly with respect to the VCR unit so that the sent infrared signals sent by the remote controller are received by the unit.

Another preferred embodiment is to provide a universal remote controller 90 with an embedded G-code decoder. Universal remote controllers provide the capability to mimic a number of different remote controllers. This reduces the number of remote controllers that a user needs to have. This is accomplished by having a learn function key 94 function on the universal remote controller, as shown in FIG. 5. If the learn function key 94 is pushed in conjunction with another key, the unit will enter into the learn mode. Incoming infra-red (IR) pulses from the remote controller to be learned are detected by the infra-red photodiode 96, filtered and wave-shaped into recognizable bit patterns before being recorded

by a microcontroller into a battery-backed static RAM as the particular IR pulse pattern for that particular key. This is done for all the individual keys.

An example of more complex learning is the following. If the learn function key 94 in conjunction with the program key 26 are pushed when the G-code switch is "ON", the unit will recognize that it is about to record the keying sequence of a predetermined specific example of timer preprogramming of the particular VCR involved. The user will then enter the keying sequence from which the universal remote controller 90 can then deduce and record the protocol of the timer preprogramming sequence. This is necessary because different VCRs may have different timer preprogramming command formats.

If keys are pushed without the learn function key 94 involved, the microcontroller should recognize it is now in the execute mode. If the key is one of the direct command keys, the microcontroller will read back from its static RAM the stored pulse sequence and send out command words through the output parallel I/O to pulse the output light emitting diode 28. If the key is the PROG key and the G-code switch is "OFF", then the microcontroller should recognize the following keys up to the next PROG key as a timer preprogramming CDTL command and send it out through the light emitting diode 28. If the G-code switch 22 is set to "ON" and the program key 26 is pushed, the microcontroller should recognize the following keys up to the next PROG key as a G-code command for timer preprogramming. It will decode the G-code into channel, date, start time and length (CDTL) and the microcontroller will then look up in it's static RAM "dictionary" the associated infra-red pulse patterns and concatenate them together before sending them off through the output parallel I/O to pulse the light emitting diode 28 to send the whole message in one continuous stream to the VCR.

FIG. 4 illustrates a possible realization of the G-code decoder 92 that could be built into the universal remote controller with embedded G-code decoder 90. A microcontroller 60 can be used as before to decode the G-code, as well as for interfacing with the input/output functions including the photodiode 96. Alternately, the G-code decoding can be performed with other hardware implementations.

The universal remote controller can also be used in another manner to simplify the interfacing problem with existing video cassette recorder/players. In particular, if the universal remote controller performs not only the G-code decoding to CDTL, but also keeps track of time via clock 85 in FIG. 4, then it is possible for the universal remote controller to send just channel, start record and stop commands to the video cassette recorder/player, which as explained before, are usually basic one key commands, which means there is no complicated protocol or sentence structure involved. Thus, to communicate with a diverse set of video cassette recorder/player models it is only necessary for the universal remote controller to "learn" each key of the remote controller it is replacing. The G-code would be entered on the universal remote controller as before and decoded into channel, date, time and length information, which would be stored in the universal remote controller. Via clock 85, the time would be checked and when the correct time arrives the universal remote controller would automatically send out commands to the VCR unit for tuning to the correct channel and for starting and stopping the recording. It would be necessary to position the universal remote controller properly with respect to the VCR unit so that the signals sent by the universal remote are received by the VCR unit.

There are a number of ways that the G-code decoding can be performed. The most obvious way is to just have a large look up table. The G-code would be the index. Unfortunately, this would be very inefficient and result in a very expensive decoder due to the memory involved. The total storage involved is a function of the number of total combinations. If we allow for 128 channels, 31 days in a month, 48 on the hour and on the half hour start times in a twenty four hour day, and 16 length selections in half hour increments, then the total number of combinations is 128x31x48x16 = 3,047,424. This number of combinations can be represented by a 7 digit number. The address to the table would be the 7 digit number. In the worse case, this requires a lookup table that has about 4,000,000 rows by 15 to 16 digital columns, depending on the particular protocol. These digital columns would correspond to the CDTL information required for "on screen programming". Each digit could be represented by a 4 bit binary number. Thus, the total storage number of bits required for the lockup table would be about 4,000,000x16x4 = 256,000,000. The present state of the art has about 1 million bits per chip. Thus, G-code decoding using a straightforward table lockup would require a prohibitively expensive number of chips.

Fortunately, there are much more clever ways of performing the G-code decoding. FIG. 6 is a flow diagram of the preferred G-code decoding technique. To understand G-code decoding, it is easiest to first explain the G-code encoding technique, for which FIG. 7 is the flow chart. Then the G-code decoding technique, which is the reverse of the G-code encoding will be explained.

The encoding of the G-codes can be done on any computer and is done prior to preparation of any program guide that would include G-codes. For each program that will be printed in the guide, a channel, date, time and length (CDTL) code 144 is entered in step 142. Step 146 separately reads the priority for the channel, date, time and length in the priority vector storage 122, which can be stored in read only memory 64. The priority vector storage 122 contains four tables: a priority vector C table 124, a priority vector D table 126, a priority vector T table 128 and a priority vector L table 130.

The channel priority table is ordered so that the most frequently used channels have a low priority number. An

example of the data that is in priority vector C table 124 follows.

channel	4	7	2	3	5	6	11	13	...
priority	0	1	2	3	4	5	6	7	...

Generally the dates of a month all have an equal priority, so the low number days in a month and the low number priorities would correspond in the priority vector D table as in the following example.

date	1	2	3	4	5	6	7	8	9	10	..
priority	0	1	2	3	4	5	6	7	8	9	..

The priority of the start times would be arranged so that prime time would have a low priority number and programs in the dead of the night would have a high priority number. For example, the priority vector T table would contain:

time	6:30pm	7:00pm	8:00pm	7:30pm	...
priority	0	1	2	3	...

An example of the data that is in the priority vector L table 130 is the following:

length of program (hours)	0.5	1.0	2.0	1.5	3.0	...
priority	0	1	2	3	4	...

Suppose the channel date time length (CDTL) 144 data is 5 10 19.00 1.5, which means channel 5, 10th day of the month, 7:00 PM, and 1.5 hours in length, then the C_p,D_p,T_p,L_p data 148 for the above example would be 4 9 1 3. Step 150 converts C_p,D_p,T_p,L_p data to binary numbers. The number of binary bits in each conversion is determined by the number of combinations involved. Seven bits for C_p, which can be denoted as C_7 C_6 C_5 C_4 C_3 C_2 C_1, would provide for 128 channels. Five bits for D_p, which can be denoted as D_5 D_4 D_3 D_2 D_1, would provide for 31 days in a month. Six bits for T_p, which can be denoted as T_6 T_5 T_4 T_3 T_2 T_1, would provide for 48 start times on each half hour of a twenty four hour day. Four bits for length, which can be denoted as L_4 L_3 L_2 L_1, would provide for a program length of up to 8 hours in half hour steps. Together there are 7+5+6+4 = 22 bits of information, which correspond to 2**22 = 4,194,304 combinations.

The next step is to use bit hierarchy key 120, which can be stored in read only memory 64 to reorder the 22 bits. The bit hierarchy key 120 can be any ordering of the 22 bits. For example, the bit hierarchy key might be:

L_8	C_3	...	T_2	C_2	T_1	C_1	L_1	D_5	D_4	D_3	D_2	D_1
22	21	...	10	9	8	7	6	5	4	3	2	1

Ideally the bit hierarchy key is ordered so that programs most likely to be the subject of timer preprogramming would have a low value binary number, which would eliminate keystrokes for timer preprogramming the most popular programs. ~~Since all the date information has equal priority, then the D_5 D_4 D_3 D_2 D_1 bits are first. Next T_1 C_1 L_1 are~~ used, because for whatever date it is necessary to have a time channel and length and T_1 C_1 L_1 are the most probable in each case due to the ordering of the priority vectors in priority vector storage 122. The next bit in the hierarchy key is determined by the differential probabilities of the various combinations. One must know the probabilities of all the channels, times and lengths for this calculation to be performed.

For example, the probability for channels may be:

channel	4	7	2	3	5	6	11	13	...
priority	0	1	2	3	4	5	6	7	...
probability(%)	5	4.3	4	3	2.9	2.1	2	1.8	...

The probabilities for times might be:

time	6:30pm	7:00pm	8:00pm	7:30pm	...
priority	0	1	2	3	...

(continued)

probability(%)	8	7.8	6	5	...

And, the probabilities for lengths might be:

length of program (hours)	0.5	1.0	2.0	1.5	3.0	...
priority	0	1	2	3	4	...
probability(%)	50	20	15	5	4	...

The probabilities associated with each channel, time and length, as illustrated above, are used to determine the proper ordering. Since the priority vector tables are already ordered by the most popular channel, time, and length, the order in which to select between the various binary bits for one table, for example selecting between the C_7 C_6 C_5 C_4 C_3 C_2 C_1 bits, is already known. The C_1 bit would be selected first because as the lowest order binary bit it would select between the first two entries in the channel priority table. Then the C_2 bit would be selected and so on. Similarly, the T_1 and L_1 bits would be used before any of the other time and length bits. A combination of the C_1, T_1, L_1 and D_5 D_4 D_3 D_2 D_1 bits should be used first, so that all the information is available for a channel, date, time and length. The D_5 D_4 D_3 D_2 D_1 bits are all used because the date bits all have equal priority and all are needed to specify a date even if some of the bits are binary zero.

At this point the bit hierarchy key could be:

T_1 C_1 L_1 D_5 D_4 D_3 D_2 D_1 The first channel binary bit C_1 by itself can only select between $2^1 = 2$ channels, and the first two channels have a probability percent of 5 and 4.3, respectively. So the differential probability of C_1 is 9.3. Similarly, the differential probability of T_1 is 8 + 7.8 = 15.8, and the differential probability of L_1 is 50 + 20 = 70. If the rules for ordering the bit hierarchy key are strictly followed, then the first 8 bits of the bit hierarchy key should be ordered as:

C_1 T_1 L_1 D_5 D_4 D_3 D_2 D_1,

because L_1 has the highest differential priority so it should be first, followed by T_1, and then C_1.

The question at that point is what should the next bit in the hierarchy key be: T_2, C_2, or L_2. This is determined by the differential probabilities, which can be calculated from the above tables for each bit. Since we are dealing with binary bits, the C_2 in combination with C_1 selects between $2^2 = 4$ channels or 2 more channels over C_1 alone. The differential probability for C_2 is then the additional probabilities of these two additional channels and for the example this is: 4 + 3 = 7. In a similar manner C_3 in combination with C_1 and C_2 selects between $2^3 = 8$ channels or $4 = 2^{(3-1)}$ more channels over the combination of C_1 and C_2. So the differential probability of C_3 is the additional probabilities of these four additional channels and for the example this is: 2.9 + 2.1 + 2 + 1.8 = 8.8. In a similar manner, the differential probabilities of T_2 and L_2 can be calculated to be 6 + 5 = 11 and 15 + 5 = 20, respectively. Once all the differential probabilities are calculated, the next step is determining which combinations of bits are more probable.

Now for the above example, which combination is more probable: T_2 with C_1 L_1, or C_2 with T_1 L_1, or L_2 with T_1 C_1. This will determine the next bit in the key. So, which is greater: 11x9.3x70= 7161; 7x15.8x70= 7742; or 20x15.8x9.3= 2938.8? In this case the combination with the greatest probability is 7x15.8x70= 7742, which corresponds to C_2 with T_1 L_1. So, C_2 is selected as the next bit in the bit hierarchy key.

The next bit is selected in the same way. Which combination is more probable: C_3 with T_1 L_1, or T_2 with C_1 or C_2 and L_1, or L_2 with C_1 or C_2 and T_1. For the example shown, which has the greatest probability: 8.8x15.8x70= 9732.8; 11x(9.3+7)x70= 12551; or 20x(9.3+7)x15.8= 5150.8? In this case the combination with the greatest probability is 11x (9.3+7)x70= 12551, which corresponds T_2 with C_1 or C_2 and L_1. So, T_2 is selected as the next bit in the bit hierarchy key. This procedure is repeated for all the differential probabilities until the entire key is found.

Alternately, the bit hierarchy key can be just some arbitrary sequence of the bits. It is also possible to make the priority vectors interdependent, such as making the length priority vector dependent on different groups of channels. Another technique is to make the bit hierarchy key 120 and the priority vector tables 122, a function of clock 42, as shown in FIG. 7. This makes it very difficult for the key and therefore the coding technique to be duplicated or copied.

For example it is possible to scramble the date bits in the bit hierarchy key 120 as a function of the clock. This would not change the effectiveness of the bit hierarchy key in reducing the number of binary bits for the most popular programs, because the date bits all are of equal priority. This could be as simple as switching the D_1 and D_5 bits periodically, such as every day or week. Thus the bit hierarchy key 120 would switch between

... C_1 T_1 L_1 D_5 D_4 D_3 D_2 D_1 and

... C_1 T_1 L_1 D_1 D_4 D_3 D_2 D_5.

Clearly other permutations of the bit hierarchy key as a function of the clock are possible.

The priority vector tables could also be scrambled as a function of the clock. For example, the first two channels

in the priority channel table could just be swapped periodically. If this technique is followed, then the C_p of 148 in FIG. 7 would change as a function of the clock 42. For example,

channel	4	7	2	3	5	6	11	13	...
priority	0	1	2	3	4	5	6	7	...

would change periodically to:

channel	7	4	2	3	5	6	11	13	...
priority	0	1	2	3	4	5	6	7	...

This would be a fairly subtle security technique, because a decoder that was otherwise correct would only fail if those first two channels were being used. Other clock dependencies are also possible to provide security for the coding technique.

However it is derived, the bit hierarchy key 120 is determined and stored. In step 154 the binary bits of C_p,D_p,T_p, L_p are rearranged according to the bit hierarchy key 120 to create one 22 bit binary number. Then the resulting 22 bit binary number is converted to decimal in the convert binary number to decimal G-code step 156. The result is G-code 158.

If the priority vector and the bit hierarchy key are well matched to the viewing habits of the general population, then it is expected that the more popular programs would require no more than 3 or 4 digits for the G-code.

Now that the encoding technique has been explained the decoding technique is just reversing the coding technique. This is done according to the flow chart of FIG. 6. This is the preferred G-code decoding that can be built into G-code decoder 38 in VCR 14 or the remote controller G-code decoders 82 and 92 in FIGs. 3 and 5.

The first step 102 is to enter G-code 104. Next the G-code 104 is converted to a 22 bit binary number in step 106. Then the bits are reordered in step 108 according to the bit hierarchy key 120 to obtain the reordered bits 110. Then the bits are grouped together and converted to decimal form in step 112. As this point we obtain C_p,D_p,T_p,L_p data 114, which are the indices to the priority vector tables. For the above example, we would have at this step the vector 4 9 1 3. This C_p,D_p,T_p,L_p data 114 is then used in step 116 to lockup channel, date, time, and length in priority vector storage 122. The CDTL 118 for the example above is 5 10 19.00 1.5, which means channel 5, 10th day of the month, 7:00 PM, and 1.5 hours in length.

If the coding technique is a function of the clock then it is also necessary to make the decoding technique a function of the clock. It is possible to make the bit hierarchy key 120 and the priority vector tables 122, a function of clock 42, as shown in FIG. 6. This again makes it very difficult for the key and therefore the coding technique to be duplicated or copied. It is also possible to have the decoding and encoding techniques dependent on any other predetermined or preprogrammable algorithm.

Although the above G-code encoding and decoding technique is a preferred embodiment, it should be understood that there are many ways to perform the intent of the invention which is to reduce the number of keystrokes required for timer preprogramming. To accomplish this goal there are many ways to perform the G-code encoding and decoding. There are also many ways to make the encoding and decoding technique more secure besides just making the encoding and decoding a function of the clock. This security can be the result of any predetermined or preprogrammed algorithm.

It is possible in the G-code coding and decoding techniques to use mixed radix number systems instead of binary numbers. For example, suppose that there are only 35 channels, which would require 6 binary bits to be represented; however, 6 binary bits can represent 64 channels, because $2^6 = 64$. The result is that in a binary number system there are 29 unnecessary positions. This can have the effect of possibly making a particular G-code longer than it really needs to be. A mixed radix number system can avoid this result. For example, for the case of 35 channels, a mixed radix number system with the factors of 7^1 and 5^0 can represent 35 combinations without any empty space in the code. The allowed numbers for the 7^1 factor are 0, 1, 2, 3, and 4. The allowed numbers for the 5^0 factor are 0, 1, 2, 3, 4, 5, and 6. For example, digital 0 is represented in the mixed radix number system as 00. The digital number 34 is represented in the mixed radix number system as 46, because $4*7^1+6*5^0 = 34$. The major advantage of a mixed radix number system is in prioritizing the hierarchy key. If the first 5 channels have about equal priority and the next 30 are also about equal, then the mixed radix number system allows the two tiers to be accurately represented. This is not to say that a mixed radix number system is necessarily preferable. Binary numbers are easier to represent in a computer and use of a fixed radix number system such as binary numbers allows a pyramid of prioritization to be easily represented in the hierarchy key.

Another feature that is desirable in all of the embodiments is the capability to key in the G-code once for a program and then have the resulting CDTL information used daily or weekly. Ordinarily the CDTL information is discarded once it is used. In the case of daily or weekly recording of the same program, the CDTL information is stored and used until

it is cancelled. The desire to repeat the program daily or weekly can be performed by having a "WEEKLY" or "DAILY" button on the remote controller or built into the VCR manual controls. Another way is to use one key, such as the PROG key and push it multiple times within a certain period of time such as twice to specify daily or thrice to specify weekly. For example, if the G-code switch is "ON" and the G-code for the desired program is 99 then daily recording of the program can be selected by the following keystrokes:

"PROG 99 DAILY PROG"

or by:

"PROG 99 PROG P ROG".

The G-code 99 would be converted to CDTL information, which would be stored and used daily in this case. The recording would begin on the date specified and continue daily after that using the same channel time and length information. A slight twist is that daily recording could be automatically suspended during the weekends, because most daily programs are different on Saturday and Sunday.

Once a daily or weekly program is set up, then it can be used indefinitely. If it is desired to cancel a program and if there is a "CANCEL" button on the remote controller or manual control for the VCR, then one way to cancel a program (whether it is a normal CDTL, daily or weekly entry) is to key in the following:

"PROG xx CANCEL", where xx is the G-code.

Again as before there are alternate ways of accomplishing this.

If "on screen programming" is available, then the programs that have been selected for timer preprogramming could be reviewed on the screen. The daily and weekly programs would have an indication of their type. Also the G-codes could be displayed along with the corresponding CDTL information. This would make it quite easy to review the current "menu" and either add more programs or cancel programs as desired.

A television calendar 200 according to this invention is illustrated in FIG. 8. As shown, the television calendar has multiple day of year sections 202, multiple day sections 204, multiple time of day sections 206, channel indications 208, and descriptive program indications 210 arranged in a manner that is common in television guide publications. Arranged in relation to each channel indication is a compressed code 212 or G-code containing the channel, date, time and length information for that entry in the television calendar. FIG. 8 shows how easy it is to perform timer programming. All one needs to do is find the program one wants to watch and enter the compressed code. This is in contrast to having to deal with all the channel, date, time and length entries separately. At least the channel, date and time are explicitly stated in the television guide. The length is usually only available by searching the guide to find the time of day section 204 where a new program begins and then performing some arithmetic to find the length of the program. Using the compressed G-code avoids all these complications.

For cable television programs, there is an additional issue that needs to be addressed for the compressed G-code to be useful. In a normal television guide, CDTL information is available for all the normal broadcast channels in the form of numbers including the channel numbers, such as channel 4 or 7. However, for cable channels like HBO, ESPN etc., only the names of the channels are provided in most television listings. The reason for this is that in some metropolitan areas, such as Los Angeles, there may be only one (1) edition of television guide, but there may be quite a few cable carriers, each of which may assign HBO or ESPN to different cable channel numbers. In order for a compressed code such as the G-code to be applicable to the cable channels as published by a wide area television guide publication, the following approach can be used.

First, all the cable channels would be permanently assigned a unique number, which would be valid across the nation. For example, we could assign ESPN to cable channel 1, HBO as cable channel 2, SHO as cable channel 3, etc. ~~This assignment would be published by the television guide publications~~.

The video cassette recorder apparatus, such as the remote controller, the VCR unit or both, could then be provided with two (2) extra modes: "set" and "cable channel". One way of providing the user interface to these modes would be to provide two (2) extra buttons: one called SET and one called CABLE CHANNEL. The buttons could be located on the video cassette recorder unit itself or located on a remote controller, as shown in FIGs 1, 3 and 5, where SET is element 168 and CABLE CHANNEL is element 170. Of course, other user interfaces are possible.

Next, the television viewer would have to go through a one-time "setting" procedure of his VCR for all the cable channels that he would likely watch. This "setting" procedure would relate each of the assigned numbers for each cable channel to the channel number of the local cable carrier. For example, suppose that the local cable carrier uses channel 6 for ESPN, then cable channel number 1 could be assigned to ESPN, as shown in the following table.

Cable Channel Name	Assigned Cable Chan. No.	Channel Number in the local cable carrier
EPSN	1	6
HBO	2	24
SHO	3	23

(continued)

Cable Channel Name	Assigned Cable Chan. No.	Channel Number in the local cable carrier
.	.	.
.	.	.
.	.	.
DIS	8	25

The user could perform the "setting" procedure by pushing the buttons on his remote controller as follows:

SET 06 CABLE CHANNEL 1 PROGRAM
SET 24 CABLE CHANNEL 2 PROGRAM
SET 23 CABLE CHANNEL 3 PROGRAM
SET 25 CABLE CHANNEL 8 PROGRAM

The "setting" procedure would create a cable channel address table 162, which would be loaded into RAM 52 of command controller 36. For the above example, the cable channel address table 162 would have the following information.

CABLE CHANNEL ADDRESS TABLE 162	
1	6
2	24
3	23
.	
.	
.	
8	25

After the "setting" procedure is performed, the TV viewer can now select cable channels for viewing by the old way: eg. pushing the key pad buttons 24 will select HBO. He can also do it the new way: eg. by pushing CABLE CHANNEL 2, which will also select HBO. The advantage of the new way is that the television guide will publish [C2] next to the program description, so the viewer will just look up the assigned channel number instead of having to remember that HBO is local cable channel 24. When the CABLE CHANNEL button is pushed, command controller 36 knows that it will look up the local cable channel number in cable channel address table 162 to tune the VCR to the correct channel.

For timer preprogramming and for using the compressed G-code, a way to differentiate between broadcast and cable channels is to add an eighth channel bit, which would be set to 0 for normal broadcast channels and 1 for cable channels such as HBO. This eighth channel bit could be one of the low order bits such as the third bit C_3 out of the eight channel bits, so that the number of bits to specify popular channels is minimized, whether they be normal broadcast or cable channels. For a normal broadcast channel, the 7 other bits can be decoded according to priority vector C table 124. For a cable channel, the 7 other bits can be decoded according to a separate cable channel priority vector table 160, which could be stored in ROM 54 of microcontroller 36. The cable channel priority vector table can be set ahead of time for the entire country or at least for an area covered by a particular wide area television guide publication.

A television guide that carries the compressed code known as the G-code will now print the cable channel information as follows:

```
                6:30 pm
[C2]            HBO  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx (4679)
                xxxxxx(program description)xxxxxxxxxx
                xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

The [C2] in front of HBO reminds the viewer that he needs only to push CABLE CHANNEL 2 to select HBO. The (4679) is the G-code for this particular program.

FIG. 8 shows a section of a television guide. The cable channels all have an assigned cable channel number 188 after the cable channel mnemonic. Other than that the cable channel information is arranged the same as the broadcast channels with a compressed G-code 212 associated with the channel.

For timer preprogramming, the viewer need only enter the number 4679 according to the unit's G-code entry procedure, eg. PROG 4679 PROG. The G-code decoder unit will decode this G-code into "cable channel 2" and will also signal the command controller 36 with a cable channel signal 164, as shown in FIGs. 1 and 2, because the extra channel bit will be "1" which distinquishes that the G-code is for a cable channel; then, since the association of "cable channel 2" with channel 24 has been established earlier in the "setting" procedure, the command controller, if it has received a cable channel signal, will immediately look up 2 in the cable channel address table 162 to translate it to cable channel 24, which will be used as the recording channel at the appropriate time. By associating the G-code with the assigned cable channel number rather than the local cable channel number, the G-code for that program will be valid in the whole local area, which may have many different cable carriers each of which may have different local cable channel numbers.

To include the cable channel compressed G-code feature, the decoding and encoding algorithms are as shown in FIGs 9 and 10, respectively. The encoding should be explained first before the decoding. The primary change in FIG. 10 from FIG. 7 is that a cable channel priority vector table 160 has been added and is used in look up priority step 180 if a cable channel is being encoded. Also if a cable channel is being encoded then the cable channel bit is added in the correct bit position in the convert $C_pD_pT_pL_p$ to binary numbers step 182. This could be bit C_3, as discussed before. The bit hierarchy key could be determined as before to compress the number of bits in the most popular programs; however, it needs to be 23 bits long to accommodate the cable channel bit. The maximum compressed G-code length could still be 7 digits, because 2^{23}= 8,388,608.

The decoding is shown in FIG. 9 and is just the reverse of the encoding process. After step 108, test cable channel bit 174 is added and effectively tests the cable channel bit to determine if it is a "1". If so then the command controller 36 is signaled via cable channel signal 164 of FIGs. 1 and 2 that the CDTL 118 that will be sent to it from G-code decoder 38 is for a cable channel. Then the command controller knows to look up the local cable carrier channel number based on the assigned cable channel number. In step 176 of FIG. 9, the priority vector tables including the cable channel priority vector table 160 are used to look up the CDTL 118 information.

An alternate to having the command controller receive a cable channel signal 164 is for the G-code decoder to perform all of the decoding including the conversion from assigned cable channel number to local cable carrier number. This would be the case for the remote controller implementation of FIG. 3. FIG. 11 shows the implementation of the entire decode algorithm if this step is included. All that needs to added is convert assigned channel to local cable carrier channel step 166, which performs a lockup in cable channel address table 162, if the cable channel bit indicates that a cable channel is involved. Step 166 effectively replaces step 174 in FIG. 9.

Another issue that needs addressing is the number of programs that can be preprogrammed. Since the G-code greatly simplifies the process of entering programs, it is likely that the user will quickly learn and want to enter a large number of programs; however, some existing VCRs can only store up to four (4) programs, while some can store as many as eight. Thus, the user may get easily frustrated by the programming limitations of the VCR.

One approach to this problem, is to perform the compressed G-code decoding in the remote controller and provide enough memory there to store a large number of programs, eg. 20 or 40. The remote controller would have the capability of transferring periodically several of these stored programs at a time to the VCR main unit. To provide this capability, extra memory called stack memory 76 is required inside the remote unit, as shown in Fig. 12, which other than that is identical to FIG. 4. Stack memory 76 can be implemented with a random access memory, which may in fact reside in the microcontroller itself, such as RAM 62.

The stack memory 76 is where new entry, insertion & deletion of timer preprogramming information is carried out. It is also where editing takes place. The top memory locations of the stack, for example the first 4 locations, correspond exactly to the available timer preprogramming memory in the VCR main unit. Whenever the top of the stack memory is changed, the new information will be sent over to the VCR main unit to update it.

FIG. 13 shows the sequence of events when the user enters a G-code program on the keypad of the remote controller. For illustration purposes, suppose the VCR main unit can only handle four (4) programs. Suppose also that the stack memory capacity is 20 timer preprograms. Referring to the flow chart in FIG.13, when the user enters a G-code in step 230, the microcontroller 60 first decodes it into the CDTL information in step 234 and displays it on the display unit with the additional word "entered" also displayed. The microcontroller then enters the decoded program into the stack memory in step 236.

If this is the first program entered, it is placed at the top location of the stack memory. If there are already programs in the stack memory, the newly entered program will first be provisionally placed at the bottom of the stack memory. The stack memory will then be sorted into the correct temporal order in step 240, so that the earliest program in time

will appear in the top location and the last program in time will be at the bottom. Notice that the nature of the temporally sorted stack memory is such that if stack memory location n is altered, then all the locations below it will be altered.

For example, suppose the stack memory has six (6) entries already temporally ordered, and a new entry is entered whose temporal ordering places it in location 3 (1 being the top location). If this entry is placed into location 3, information which was in location 3, 4, 5, 6 will be shifted to locations 4, 5, 6, and 7. Locations 1 and 2 will remain unchanged.

The microcontroller 60, after doing the temporal ordering, checks in step 242 whether the first n entries have changed from before, wherefor the current example n equals 4. In this case, since a new program has been entered into location 3, what used to be in location 3 now moves to location 4. Since the VCRs main unit program menu of 4 entries should correspond exactly to location 1 through 4 of the stack memory, entries 3 and 4 on the VCR main unit must now be revised. The microcontroller therefore sends out the new entries 3 and 4 to the main unit, in step 244 of FIG. 13. If the newly entered program, after temporal ordering, gets entered into location 5, then entries 1 through 4 have not changed from before and the microcontroller will not send any message to the VCR main unit and the microcontroller will just resume monitoring the clock 85 and the keyboard 88 as per step 246. It is assumed that when the user enters the G-code in step 230, the remote controller is pointed at the VCR main unit. The other steps of FIG. 13 happen so fast that the changes are sent in step 244 while the remote controller is still being pointed at the VCR main unit.

If the user decides to delete a program in step 232, the deletion is first carried out in the stack memory. If the first 4 entries are affected, the microcontroller will send the revised information over to the VCR main unit. If the first 4 entries are not affected, then again the remote controller unit will not send anything. The deletion will only change the lower part of the stack (lower meaning location 5 to 20). This new information will be sent over to the VCR main unit at the appropriate time.

In the meantime, the VCR main unit will be carrying out its timer programming function, completing its timing preprogramming entries one by one. By the time all 4 recording entries have been completed, the stack in the remote must send some new entries over to "replenish" the VCR main unit (if the stack has more than 4 entries).

The real time clock 85 in the remote controller unit is monitored by the microcontroller to determine when the programs in the main unit have been used up. Referring to the flow chart in FIG. 14, the microcontroller periodically checks the clock and the times for the programes at the top of the stack in step 250 (say the first 4 entries), which are identical to the VCRs main units menu. If on one of the periodic checks, it is determined that the recording of the main unit's menu is complete, then if there are more entries in the stack, which is tested in step 252, the display unit will be set to a blinking mode or display a blinking message in step 258 to alert the user to send more programs. Next time the user picks up the remote unit, the blinking will remind him that the VCR main unit's program menu has been completed and it is time to replenish the VCR main unit with program entries stored in the remote. The user simply picks up the remote and points towards the VCR main unit and preses "ENTER". This will "pop" the top of the stack memory in step 260, ie pop all the entries in the stack up by four locations. The microcontroller will then send the new "top of the stack" (ie top 4 entries) over to the VCR main unit in step 262. This process will repeat until the whole stack has been emptied.

Claims

1. A system for automatically controlling recording by a video cassette recorder (14) of a channel of video signals ~~under control of a channel command beginning on the calendar day specified by a day command, at the time-of-~~day specified by a time-of-day command, and for the length of time specified by a length command, the system comprising:

   an input (30) for receiving representations of coded indications, each representative of, the combination of one of each said channel command, day command, time-of-day command, and length command; and
   a decoder (38) for decoding any said coded indication to individual channel command, day command, time-of-day command, and length command for control of the video cassette recorder, characterised in that the said coded indications received by the input are compressed in length before they are received by the input and in that the decoder (38) expands said compressed coded indications received.

2. A system according to Claim 1, characterised in that the input (30) and decoder (38) are an integral part of the video cassette recorder.

3. A system according to Claim 1, characterised by a remote transmitter (12) which comprises said input.

4. A system according to Claim 2 or to Claim 3, including a video cassette recorder (14) characterised in that the

video cassette recorder (14) includes control means (36) for interpreting whether said compressed coded indication has been received by the video cassette recorder.

5. A system according to Claim 4, characterised in that said control means (36) comprises a microprocessor.

6. A system according to Claim 1, characterised by a remote hand transmitter (12) which comprises said input and decoder.

7. A system according to Claim 6, characterised in that said remote handheld transmitter comprises a universal remote controller capable of learning protocols of different remote controllers with which said universal remote controller interfaces.

8. A system according to Claim 3 or to Claim 6, wherein said input comprises a keyboard entry device.

9. A system according to Claim 2 or to Claim 6, characterised in that said decoder (38) comprises a microprocessor.

10. A system according to Claim 1, characterised by a clock (42) for providing an output as a function of time and wherein the decoder (38) comprises means for generating said channel, day, time-of-day and length commands as a function of the output of the clock (42).

11. A system according to Claim 1, characterised in that said decoder comprises:

means for converting said compressed coded indication into a compressed code of binary bits;
means for reordering the bits in said compressed code of binary bits to obtain a reordered binary compressed code;
means for grouping said reordered binary compressed code into binary channel, date, time and length priority numbers; and
means for using said binary channel, date, time and length priority numbers to derive said channel, day, time-of-day and length command.

12. A system according to Claim 11, characterised by a clock (42) providing an output as a function of time and wherein said means for reordering the bits in said compressed code comprises means for reordering the bits as a function of the output of the clock (42).

13. A system according to Claim 11, characterised by a clock (42) providing an output as a function of time wherein said means for deriving said channel, day, time-of-day and length commands comprises means for deriving said channel, day, time-of-day and length commands as a function of the output of the clock.

14. A system according to Claim 1, characterised in that said decoder comprises:

means for converting said compressed coded indication into a compressed code of mix radix bits;
~~means for reordering the bits in said compressed code of mixed radix bits to obtain a reordered mix radix~~ compressed code;
means for grouping said reordered mixed radix compressed code into mixed radix channel, date, time and length priority numbers; and
means for using said mixed radix channel, date, time and length priority numbers to derive said channel, day, time-of-day and length commands.

15. A system according to Claim 1, further characterised by:

a clock (42) providing an output as a function of time;
means for comparing the day and time-of-day information to the clock output for a predetermined relation;
a channel selector for selecting the channel specified in the channel command after the predetermined relation is found to exist; and
an on/off controller for enabling recording by the video cassette recorder of the video signals of the selected channel comprising means operative for turning on the recording after the predetermined relation is found to exist.

16. A system according to Claim 15, characterised in that the controller comprises means for utilizing the length command to terminate the recording.

17. A system according to Claim 1, characterised in that said decoder comprises:

means for entering encoded data into the decoder (38);
means for decoding said encoded data to determine channel, date, time and length of the channel of video signals to be recorded; and
means for generating control commands from said encoded data for selection of said channel of video signals for recording and for control of the video cassette recorder to start and stop the recording of the selected channel by the video cassette recorder.

18. A method of programming a system for automatically controlling recording by a video cassette recorder of a channel of video signals specified by a channel command beginning at the time-of-day specified by a time-of-day command, on the calendar day specified by a day command and for the length of time specified by a length command, the steps comprising:

receiving coded indications, each representative of the combination of one of each said channel command, day command, time-of-day command, and length command; and
decoding any said coded indications to individual said channel command, day command, time-of-day command and length command for control of the video cassette controller, characterised in that the received coded indications are compressed coded indications and in that decoding step includes expanding said compressed coded indications.

19. A method according to Claim 18, characterised by the step of receiving the compressed coded indication in the video cassette recorder.

20. A method according to Claim 18, characterised by the step of receiving the compressed coded indication in a transmitter remote from the video cassette recorder.

21. A method according to Claim 19 or Claim 20, characterised by the step of receiving comprises the step of interpreting whether said compressed coded indication has been received by the video cassette recorder.

22. A method according to Claim 21, characterised by the step of interpreting is performed by a microprocessor.

23. A method according to Claim 18, characterised by the steps of receiving the compressed coded indication and decoding and expanding the compressed coded indication in a transmitter remote from the video cassette recorder.

24. A method according to Claim 18, characterised by the step of using a remote handheld transmitter, which interfaces with different remote controllers for learning the protocols of the different controllers.

25. ~~A method according to Claim 20 or to Claim 23, characterised in that the step of receiving comprises the step of~~ inputting the compressed coded indications with a keyboard entry device.

26. A method according to Claim 19 or Claim 23, characterised in that the step of decoding comprises the step of decoding the compressed coded indication with a microprocessor.

27. A method according to Claim 18, characterised in that the step of decoding and expanding comprises the step of performing said decoding and expanding as a function of the output of a clock.

28. A method according to Claim 18, characterised in that the step of decoding and expanding comprises the steps of:

converting said compressed coded indication into a compressed code of binary bits;
reordering the bits in said compressed code of binary bits to obtain a reordered binary compressed code;
grouping said reordered binary compressed code into binary channel, date, time and length priority numbers; and
deriving said channel, day, time-of-day and length commands from said binary channel, date, time and length priority numbers.

29. A method according to Claim 28, characterised in that the step of reordering comprises the step of performing said reordering as a function of the output of a clock.

30. A method according to Claim 28, characterised in that the step of deriving comprises the step of performing said deriving as a function of the output of a clock.

31. A method according to Claim 18, characterised in that the step of decoding and expanding comprises the steps of:

converting said compressed coded indication into a compressed code of mixed radix bits;
reordering the bits in said compressed code of mixed radix bits to obtain a reordered mixed radix compressed code;
grouping said reordered mixed radix compressed code into mixed radix channel, date, time and length priority numbers; and
deriving said channel, day, time-of-day and length commands from said mixed radix channel, date, time and length priority numbers.

32. A method according to Claim 18, characterised by the steps of:

comparing the day and time-of-day commands to the output of a clock for a predetermined relation;
selecting the channel specified in the channel command after the predetermined relation is found to exist; and
enabling recording by a video cassette recorder of the video signals on the selected channel by commencing recording after the predetermined relation is found to exist.

33. A method according to Claim 32, characterised by the step of utilizing the length command to terminate the recording.

34. A method according to Claim 18, characterised in that the step of decoding and expanding comprises the steps of:

entering encoded data into the decoder;
decoding said encoded data to determine channel, date, time and length of the channel video signals to be recorded; and
generating control commands from said encoded data for selection of said channel of video signals for recording and for control of the video cassette recorder to start and stop the recording of the selected channel by the video cassette recorder.

35. A method of converting a television programme listing into a series of unique codes for combined visual selection of programmes for direct viewing and for use in automatic recording of programmes for future viewing, comprising the steps of:

creating a day section and an associated unique day visual identifier for each of a plurality of calendar days;
positioning in relation to each of the day sections the associated day visual identifier;
creating a time-of-day section for each day section, for each of a plurality of television programme starting times and an associated unique time-of-day visual identifier;
positioning in relation to each of the time-of-day sections the corresponding associated unique time-of-day visual identifier;
creating a plurality of unique channel visual identifiers and a corresponding programme identifier for each such channel visual identifier, within each time-of-day section for such programme that starts at the time of such time-of-day section, and that is associated with the day section and time-of-day section within which it is positioned;
creating a unique coded indication for each said programme, the coded indication representing the channel, the calendar day, the time-of-day, and the length of time for said programme; and
positioning in a predetermined relation to each program identifier, the unique coded indication for each said program, characterised in that the step of creating each said unique coded indication comprises compressing the length of the coded indications normally required to program a video recorder.

36. A method according to Claim 35, characterised by the step of creating a unique coded indication for each said programme comprises the step of:

creating the unique coded indication to have less digits than the sum of the number of digits in all of the

identifiers associated with said programme plus the number of digits representing the length of time associated with said programme.

37. A method according to Claim 35, characterised by the step of creating the unique coded indication comprises the step of encoding digits representing the identifiers based on probabilities as to the frequency of occurrence of the identifiers in the programme listing.

38. A method according of Claim 36, characterised by the step of creating the unique coded indication comprises the step of:

encoding the digits in all of the identifiers associated with each said programme, plus the digits representing the length of time associated with said programme, based on probabilities assigned to the channel associated with the channel identifier, calendar day associated with the day identifier, time-of-day associated with the time-of-day identifier and length of time associated with said programme.

39. A method according to Claim 35, characterised in that the step of creating a plurality of unique channel visual identifiers further comprises the steps of:

creating at least some of said channel visual identifiers to comprise unique cable channel visual identifiers; and positioning in a predetermined relation to each said cable channel visual identifier an assigned cable channel number representing the cable channel corresponding to said cable channel visual identifier for said cable television programme.

40. A method according to Claim 35, characterised in that the step of creating a unique coded indication comprises the steps of:

creating a separate representation for each of a channel, day, time-of-day and length for any programme in the calendar;
using said representation to derive a priority number for each of said channel, date, time and length representations;
converting the priority numbers into a binary number for each of said channel, day, time and length commands;
reordering the bits of said binary numbers to obtain a compressed code of binary bits; and
converting the compressed code of binary bits into one said unique coded indication.

41. A method according to Claim 40, characterised in that the step of reordering comprises the step of performing said reordering as a function of a bit hierarchy key.

42. A method according to Claim 40, characterised in that the step of reordering comprises the step of performing said reordering as a function of the output of a clock.

43. A method according to Claim 40, characterised in that the step of using said representation to derive a priority number comprises the step of performing said derivation as a function of the output of a clock.

44. A method according to Claim 35, characterised in that the step of creating a unique coded indication comprises the steps of:

creating a separate representation for each of a channel, day, time-of-day and length for any programme in the calendar;
using said representation to derive a priority number for each of said channel, date, time and length representations;
converting the priority numbers into a mixed radix number for each of said channel, day, time and length commands;
reordering the bits of said mixed radix numbers to obtain a compressed code of mixed radix bits; and
converting the compressed code of mixed radix bits into one said unique coded indication.

45. A method according to any one of Claims 35 to 40, characterised in that each of said steps of creating comprising creating on a display medium and in that each of said steps of positioning comprises positioning on the display medium.

46. A method of permitting a large number of programmes to be timer preprogrammed for recording by a video cassette recorder for time shifted viewing where the video cassette recorder can store only N timer preprogrammed programmes, the method being characterised by the steps of providing a remote controller having a means for keeping time; entering into said remote controller compressed codes each having at least one digit and each representative of, and compressed in length from, the combination of channel, time-of-day, day and length commands for a programme; and decoding each compressed code having at least one digit to channel, time-of-day, day and length commands; providing a memory; entering each said decoded channel, time-of-day, day and length commands into said memory; reordering said channel, time-of-day, day and length commands in said memory into temporal order; and testing whether the first N entries in said memory have changed and if yes, sending the changed entries in the first N entries to said video cassette recorder.

47. A method of permitting a large number of programmes to be timer preprogrammed according to Claim 46, characterised by the steps of:

periodically checking whether stop time of Nth entry of said first N entries in memory has passed; and
if stop times of Nth entry has passed and number of entries in memory is greater than N, then turning on a means for alerting a user to activate remote controller to send more programmes to said video cassette recorder and once remote controller is activated, setting next N entries in said memory to be the first N entries in said memory and sending said first N entries to said video cassette recorder and turning off said means for alerting a user.

48. A system according to Claim 11, characterised in that said decoder further comprises:

means for detecting that said binary channel priority number contains a set cable channel bit indicating an assigned cable channel priority number; and
means for using said detected assigned priority cable channel priority number to derive a corresponding local cable channel command.

49. A method according to Claim 28, characterised in that the step of decoding and expanding further comprises the steps of:

detecting that said binary channel priority number contains a set cable channel bit indicating an assigned cable channel priority number; and
using said detected assigned priority cable channel priority number to derive a corresponding local cable channel command.

50. A method according to Claim 39, characterised in that the step of creating a unique coded indication comprises steps of:

using said representation to derive a priority number for each of said channel, date, time and length representations;
converting the priority numbers into a binary number for each of said channel, day, time and length commands;
adding a cable channel bit set to "1" if said representation is for a cable channel;
reordering the bits of said binary numbers to obtain a compressed code of binary bits; and
coverting the compressed code of binary bits into one said unique coded indication.

Patentansprüche

1. System zur automatischen Steuerung der Aufnahme eines Videokassettenrecorders (14) eines Kanals von Videosignalen unter der Steuerung eines Kanalbefehls beginnend an dem Kalendertag, der durch einen Tagbefehl spezifiziert ist, und zu einer Tageszeit, die von einem Tageszeitbefehl spezifiziert ist, und für eine Dauer, die durch einen Längenbefehl spezifiziert wird, wobei das System enthält:

einen Signaleingang (30) zum Empfangen von Repräsentationen von kodierten Angaben, die jeweils die Repräsentation einer Kombination jeweils einer der Angaben Kanalbefehl, Tagesbefehl, Tageszeitbefehl und Längenbefehl ist; und
einen Dekoder (38) zum Dekodieren irgendeiner der kodierten Angaben in einen bestimmten Kanalbefehl,

Tagesbefehl, Tageszeitbefehl und Längenbefehl zur Steuerung des Videokassettenrecorders, dadurch gekennzeichnet, daß die von dem Signaleingang empfangenen kodierten Angaben in ihrer Länge komprimiert sind, bevor sie von dem Signaleingang empfangen werden, und daß der Dekoder (38) die empfangenen komprimierten Angaben expandiert.

2. System nach Anspruch 1,
dadurch gekennzeichnet, daß der Signaleingang (30) und der Dekoder (38) ein integraler Bestandteil des Videokassettenrecorders sind.

3. System nach Anspruch 1,
gekennzeichnet durch eine Fernübertragungseinrichtung (12), die den Signaleingang enthält.

4. System nach Anspruch 2 oder 3, das einen Videorecorder (14) enthält,
dadurch gekennzeichnet, daß der Videokassettenrecorder (14) ein Steuermittel (36) zur Interpretation enthält, ob die komprimierte kodierte Angabe von dem Videokassettenrecorder empfangen wurde.

5. System nach Anspruch 4,
dadurch gekennzeichnet, daß das Steuermittel (36) einen Mikroprozessor enthält.

6. System nach Anspruch 1,
gekennzeichnet durch eine Handfernübertragunseinrichtung (12) die den Signaleingang und den Dekoder enthält.

7. System nach Anspruch 6,
dadurch gekennzeichnet, daß die Handfernübertragungseinrichtung (12) eine Universalfernbedienung enthält, die in der Lage ist, Protokolle von verschiedenen Fernbedienungen zu lernen, mit denen die Universalfernbedienung eine Schnittstellenverbindung hat.

8. System nach Anspruch 3 oder nach Anspruch 6,
wobei der Signaleingang eine Tastatureingabeeinrichtung besitzt.

9. System nach Anspruch 2 oder nach Anspruch 6,
dadurch gekennzeichnet, daß der Dekoder (38) einen Mikroprozessor enthält.

10. System nach Anspruch 1,
gekennzeichnet durch eine Uhr (42) zur Bereitstellung eines Ausgangssignals als eine Funktion der Zeit, wobei der Dekoder (38) ein Mittel zur Erzeugung der Kanal-, Tag-, Tageszeit- und Längenbefehle als eine Funktion des Ausgangssignals der Uhr (42) erzeugt.

11. System nach Anspruch 1,
dadurch gekennzeichnet, daß der Dekoder enthält:

~~Mittel zum Umwandeln der komprimierten Code-Angabe in einen komprimierten Code aus binären Bits;~~
Mittel zum Umordnen der Bits in dem komprimierten Code von binären Bits, um einen umgeordneten komprimierten binären Code zu erzielen;
Mittel zur Gruppierung des umgeordneten binären komprimierten Codes in binäre Kanal-, Datum-, Zeit- und Längenprioritätszahlen; und
Mittel zum Benutzen der binären Kanal-, Datums-, Zeit- und Längenprioritätszahlen, um den Kanal-, Tages-, Tageszeit- und Längenbefehl abzuleiten.

12. System nach Anspruch 11,
gekennzeichnet durch eine Uhr (42), die ein Ausgangssignal als eine Funktion der Zeit bereitstellt, wobei das Mittel zur Umordnung der Bits in dem komprimierten Code ein Mittel zur Umordnung der Bits als eine Funktion des Ausgangssignals der Uhr (42) enthält.

13. System nach Anspruch 11,
gekennzeichnet durch eine Uhr (42), die ein Ausgangssignal als eine Funktion der Zeit bereitstellt, wobei das Mittel zum Ableiten der Kanal-, Tages-, Tageszeit- und Langenbefehle ein Mittel zum Ableiten der Kanal-, Tages-, Tageszeit- und Längen- befehle als eine Funktion des Ausgangssignals der Uhr (42) enthält.

14. System nach Anspruch 1,
dadurch gekennzeichnet, daß der Dekoder enthält:

Mittel zum Umwandeln der komprimierten kodierten Angabe in einen komprimierten Code von gemischten Radix-Bits,
Mittel zum Umordnen der Bits in dem komprimierten Code aus gemischten Radix- Bits zur Erzielung eines umgeordneten komprimierten gemischten Radix-Codes;
Mittel zur Gruppierung des umgeordneten gemischten komprimierten Radix-Codes in gemischte Radix Kanal-, Datums-, Zeit- und Längenprioritätszahlen; und
Mittel zur Benutzung der gemischten Radix Kanal-, Datums-, Zeit- und Längen- prioritätszahlen zur Ableitung der Kanal-, Tages-, Tageszeit-, und Längenbefehle.

15. System nach Anspruch 1,
weiterhin gekennzeichnet durch:

eine Uhr (42) die ein Ausgangssignal als eine Funktion der Zeit bereitstellt;
Mittel zum Vergleichen der Tag- und Tageszeitinformation mit dem Ausgangssignal der Uhr für eine vorbestimmte Relation;
eine Kanalauswahleinrichtung zum Auswählen des in dem Kanalbefehl spezifizierten Kanals nachdem festgestellt worden ist, daß die vorbestimmte Relation existiert; und
eine Ein/Aus-Steuereinrichtung, um zu gestatten, daß der Videokassettenrecorder die Videosignale des ausgewählten Kanals aufnimmt, das ein Mittel enthält, daß dafür vorgesehen ist, die Aufnahme einzuschalten, nachdem festgestellt wurde, daß die vorbestimmte Relation existiert.

16. System nach Anspruch 15,
dadurch gekennzeichnet, daß die Steuereinrichtung ein Mittel zur Benutzung des Längenbefehls enthält, um die Aufnahme zu beenden.

17. System nach Anspruch 1,
dadurch gekennzeichnet, daß der Dekoder enthält:

Mittel zum Eingeben kodierter Daten in den Dekoder (38);
Mittel zum Dekodieren der kodierten Daten, um den Kanal, das Datum, die Zeit und die Länge des Kanals der aufzunehmenden Videosignale zu bestimmen; und
Mittel zum Erzeugen von Steuerbefehlen aus den kodierten Daten zur Auswahl des Kanals von Videosignalen zur Aufnahme und zum Steuern des Videokassettenrecorders in Bezug auf Beginn und Ende des Aufnehmens des ausgewählten Kanals durch den Videokassettenrecorder.

18. Verfahren zur Programmierung eines Systems zur automatischen Steuerung der Aufnahme durch einen Videokassettenrecorder von einem Kanal von Videosignalen, der durch einen Kanalbefehl spezifiziert ist, beginnend zu der Tageszeit, die in dem Tageszeitbefehl spezifiziert ist, an dem Kalendertag, der durch einen Tagesbefehl spezifiziert ist, ~~und für eine Dauer, die durch einen Längenbefehl spezifiziert ist, wobei die Schritte umfassen~~:
Empfangen von kodierten Angaben, die jeweils die Kombination jeweils eines Kanalbefehls, Tagesbefehls, Tageszeitbefehls und Längenbefehls repräsentieren; Dekodieren der kodierten Angaben in den jeweiligen Kanalbefehl, Tagesbefehl, Tageszeitbefehl und Längenbefehl zur Steuerung des Videokassettenrecorders, dadurch gekennzeichnet, daß die empfangenen kodierten Angaben komprimierte kodierte Angaben sind und daß der Dekodierschritt das Expandieren der komprimierten kodierten Angaben enthält.

19. Verfahren nach Anspruch 18,
gekennzeichnet durch den Schritt des Empfangens der komprimierten kodierten Angaben in den Videokassettenrecorder.

20. Verfahren nach Anspruch 18,
gekennzeichnet durch den Schritt des Empfangens der komprimierten kodierten Angabe in einer Übertragungseinrichtung, die von dem Videokassettenrecorder getrennt ist.

21. Verfahren nach Anspruch 19 oder 20,
dadurch gekennzeichnet, daß der Schritt des Empfangens den Schritt des Interpretierens beinhaltet, ob die ko-

dierte komprimierte Angabe von dem Videokassettenrecorder empfangen worden ist.

22. Verfahren nach Anspruch 21,
dadurch gekennzeichnet, daß der Schritt des Interpretierens von einem Mikroprozessor durchgeführt wird.

23. Verfahren nach Anspruch 18,
gekennzeichnet durch die Schritte des Empfangens von komprimierten kodierten Angaben und des Dekodierens und Expandierens der komprimierten kodierten Angabe in einer Übertragungseinrichtung, die von dem Videokassettenrecorder getrennt ist.

24. Verfahren noch Anspruch 18,
gekennzeichnet durch den Schritt des Benutzens einer handgehaltenen Fernübertragungseinrichtung, die eine Schnittstellenverbindung mit verschiedenen Fernbedienungen zum Lernen der Protokolle der verschiedenen Steuereinrichtungen besitzt.

25. Verfahren nach Anspruch 20 oder Anspruch 23,
dadurch gekennzeichnet, daß der Schritt des Empfangens den Schritt des Eingebens der komprimierten kodierten Angaben mit einer Tastatureingabevorrichtung enthält.

26. Verfahren nach Anspruch 19 oder Anspruch 23,
dadurch gekennzeichnet, daß der Schritt des Dekodierens den Schritt des Dekodierens der komprimierten kodierten Angabe mit einem Mikroprozessor enthält.

27. Verfahren nach Anspruch 18,
dadurch gekennzeichnet, daß der Schritt des Dekodierens und Expandierens den Schritt der Durchführung der Dekodierung und Expandierung als eine Funktion des Ausgangssignals einer Uhr enthält.

28. Verfahren nach Anspruch 18,
gekennzeichnet, daß der Schritt des Dekodierens und Expandierens die folgenden Schritte enthält:

Umwandlung der komprimierten kodierten Angabe in einen komprimierten Code aus binären Bits;
Umordnung der Bits in dem komprimierten Code von binären Bits, um einen umgeordneten binären komprimierten Code zu erzielen;
gruppenweise Anordnung des umgeordneten binären komprimierten Codes in binäre Kanal-, Datums-, Zeit- und Längenprioritätszahlen; und
Ableitung der Kanal-, Tages-, Tageszeit und Längenbefehle aus den binären Kanal-, Datums-, Zeit- und Längenprioritätszahlen.

29. Verfahren nach Anspruch 28,
dadurch gekennzeichnet, daß der Schritt des Umordnens den Schritt der Durchführung des Umordnens als eine Funktion des Ausgangssignals einer Uhr enthält.

30. Verfahren nach Anspruch 28,
dadurch gekennzeichnet, daß der Schritt des Ableitens den Schritt den Schritt des Ableitens als eine Funktion des Ausgangssignals einer Uhr enthält.

31. Verfahren nach Anspruch 18,
dadurch gekennzeichnet, daß der Schritt des Dekodierens und Expandierens die folgenden Schritte enthält:

Umwandlung der komprimierten kodierten Angabe in einen komprimierten Code aus gemischten Radix-Bits;
Umordnung der Bits in dem komprimierten Code von gemischten Radix-Bits zur Erzielung eines umgeordneten gemischten komprimierten Radix-Codes;
gruppenweise Anordnung des umgeordneten gemischten komprimierten Radix-Codes in gemischte Radix-Kanal-, Datums-, Zeit-, und Längenprioritätszahlen; und
Ableiten der Kanal-, Tages-, Tageszeit-, Längenbefehle aus den gemischten Radixkanal-, Datums-, Zeit-, und Längenprioritätszahlen.

32. Verfahren nach Anspruch 18,

gekennzeichnet durch die folgenden Schritte:

Vergleichen der Tages- und Tageszeitbefehle mit dem Ausgangssignal einer Uhr für eine vorbestimmte Relation;
Auswählen des Kanals, der durch den Kanalbefehl spezifiziert ist, nachdem festgestellt wurde, daß die vorbestimmte Relation existiert; und
Auslösen des Aufnehmens der Videosignale des ausgewählten Kanals von einem Videokassettenrecorder durch Beginnen der Aufnahme, nachdem festgestellt wurde, daß die vorbestimmte Relation existiert.

33. Verfahren nach Anspruch 32,
gekennzeichnet durch den Schritt der Benutzung des Längenbefehls zum Beenden der Aufnahme.

34. Verfahren nach Anspruch 18,
dadurch gekennzeichnet, daß der Schritt des Aufnehmens und Expandierens die folgenden Schritte enthält:

Eingeben von kodierten Daten in den Dekoder;
Dekodieren der kodierten Daten, um den Kanal, das Datum, die Zeit und die Länge der aufzunehmenden Videokanalsignale zu bestimmen; und Erzeugen von Steuerbefehlen aus den kodierten Daten zur Auswahl des Videosignalkanals für die Aufnahme und zur Steuerung des Videokassettenrecorders zum Beginn und zum Ende des Aufnehmens des ausgewählten Kanals durch den Videokassettenrecorder.

35. Verfahren zum Umwandeln einer Fernsehprogrammliste in eine Folge von eindeutigen Codes für die kombinierte visuelle Auswahl von Programmen zum direkten Betrachten und zur Benutzung für die automatische Aufnahme von Programmen zum zukünftigen Anschauen, das die folgenden Verfahrensschritte enthält:

Erzeugung eines Tagesabschnitts und eines zugehörigen eindeutigen visuellen Tagesidentifizierelementes für jeden der Vielzahl von Kalendertagen;
Positionierung des zugehörigen visuellen Tagesidentifizierelementes in Beziehung zu jedem der Tagesabschnitte;
Schaffung eines Tageszeitabschnitts für jeden Tagabschnitt und für jeden der Vielzahl von Fernsehprogrammstartzeiten und eines zugehörigen eindeutigen visuellen Tageszeitidentifizierelementes;
Anordnung des entsprechenden zugehörigen eindeutigen visuellen Tageszeitidentifizierelementes in Bezug zu jedem der Tageszeitabschnitte;
Bereitstellung einer Vielzahl von eindeutigen visuellen Kanalidentifizierelementen und eines korrespondierenden Programmidentifizierelementes für jeden dieser visuellen Kanalidentifizierelemente für jeden Tageszeitsbschnitt für solch ein Programm, das zur Zeit des Tageszeitabschnitts beginnt und das zu dem Tagesabschnitt und dem Tageszeitabschnitt gehört, in dem es angeordnet ist;
Bereitstellung einer eindeutigen kodierten Angabe für jedes dieser Programme, wobei die kodierte Angabe den Kanal, den Kalendertag, die Tageszeit und die Dauer des Programms repräsentiert; und
Positionierung der eindeutigen kodierten Angabe für jedes der Programme in einer vorbestimmten Beziehung zu jedem Programmidentifizierelement,
~~dadurch gekennzeichnet, daß der Schritt des Bereitstellens der eindeutigen kodierten Angabe eine Längen~~komprimierung der kodierten Angaben enthält, die normalerweise für die Programmierung eines Videorecorders erforderlich sind.

36. Verfahren nach Anspruch 35, durch gekennzeichnet, daß der Schritt des Bereitstellens einer eindeutigen kodierten Angabe für jedes Programm den folgenden Schritt enthält;
Bereitstellen der eindeutigen kodierten Angabe mit weniger Ziffern, als die Summe der Anzahl von Ziffern von allen Identifizierelementen, die mit dem Programm assoziiert sind, plus der Anzahl von Ziffern, die die Programmdauer repräsentieren.

37. Verfahren nach Anspruch 35,
dadurch gekennzeichnet, daß der Schritt des Bereitstellens der eindeutigen kodierten Angabe den Schritt des Kodierens von Ziffern enthält, die die Identifizierelemente repräsentieren, basierend auf Wahrscheinlichkeiten bezüglich der Frequenz des Auftretens der Identifizierelemente in der Programmliste.

38. Verfahren nach Anspruch 38,
dadurch gekennzeichnet, daß der Schritt des Bereitstellens der eindeutigen kodierten Angabe den folgenden Ver-

fahrensschritt enthält:
Kodieren der Ziffern in allen Identifizierelementen, die mit einem jeweiligen Programm assoziiert sind, plus der Ziffern, die die Programmdauer repräsentieren, basierend auf Wahrscheinlichkeiten bezüglich eines Kanals, der mit einem Kanalidentifizierelement assoziiert ist, eines Kalendertages, der einem Tagidentifizierelement zugeordnet ist, einer Tageszeit, die einem Tageszeitidentifizierelement zugewiesen ist und einer Dauer, die zu einem Programm gehört.

39. Verfahren nach Anspruch 35,
dadurch gekennzeichnet, daß der Schritt des Bereitstellens eine Vielzahl von eindeutigen visuellen Kanalidentifizierelementen weiterhin die folgenden Verfahrensschritte enthält:

Bereitstellen wenigstens einiger der visuellen Kanalidentifizierelementen derart, daß eindeutige visuelle Kabelkanalidentifizierelemente enthalten sind; und
Anordnung einer zugehörigen Kabelkanalnummer in vorbestimmter Relation zu jedem visuellen Kabelkanalidentifizierelement, das den Kabelkanal repräsentiert, der dem visuellen Kabelkanalidentifizierelement für das Kabelfernsehprogramm entspricht.

40. Verfahren nach Anspruch 35,
dadurch gekennzeichnet, daß der Schritt des Bereitstellens einer eindeutigen kodierten Angabe die folgenden Verfahrensschritte enthält;

Bereitstellen einer separaten Repräsentation jeweils für einen Kanal, Tag, Tageszeit und Länge für jedes Programm in dem Kalender;
Benutzung der Repräsentation, um eine Prioritätszahl für jede der Kanal-, Datums-, Zeit- und Längenrepräsentationen abzuleiten;
Umwandlung der Prioritätszahl in eine binäre Zahl für jede der Kanal-, Tages-, Zeit- und Längenbefahle;
Umordnen der Bits der Binärzahlen, um einen komprimierten Code aus binären Bits zu erzielen; und
Umwandlung des komprimierten Codes aus binären Bits in die eindeutige kodierte Angabe.

41. Verfahren nach Anspruch 40,
dadurch gekennzeichnet, daß der Schritt des Umordnens den Verfahrensschritt des Durchführens der Umordnung als eine Funktion eines Bit-Hierarchieschlüssels enthält.

42. Verfahren nach Anspruch 40,
dadurch gekennzeichnet, daß der Schritt des Umordnens den Schritt des Durchführens der Umordnung als eine Funktion des Ausgangssignals einer Uhr enthält.

43. Verfahren nach Anspruch 40,
dadurch gekennzeichnet, daß der Schritt der Benutzung der Repräsentation zur Ableitung einer Prioritätszahl den Schritt des Durchführens der Ableitung als eine Funktion des Ausgangssignals einer Uhr enthält.

44. ~~Verfahren nach Anspruch~~ 35,
dadurch gekennzeichnet, daß der Schritt des Bereitstellens einer eindeutigen kodierten Angabe die folgenden Verfahrensschritte enthält:

Bereitstellen einer separaten Repräsentation jeweils für einen Kanal, Tag, Tageszeit und Länge für ein Programm in dem Kalendrium;
Benutzung der Repräsentation, um eine Prioritätszahl für jeden der Kanal-, Datums-, Zeit- und Längenrepräsentationen abzuleiten;
Umwandlung der Prioritätszahlen in eine gemischte Radix-Zahl für jeden der Kanal-, Tages-, Zeit- und Längenbefehle;
Umordnung der Bits der gemischten Radix-Zahlen, um einen komprimierten Code von gemischten Radix-Bits zu erzielen; und
Umwandlung des komprimierten Codes aus gemischten Radix-Bits in die eine eindeutige kodierte Angabe.

45. Verfahren nach einem der Ansprüche 35 bis 40,
dadurch gekennzeichnet, daß jeder der Schritte des Bereitstellens das Bereitstellen auf einem Anzeigemedium enthält und daß jedes der Schritte des Anordnens eine Anordnung auf dem Anzeigemedium enthält.

46. Verfahren, um einer großen Anzahl von Programmen zu gestatten, durch einen Timer für eine Aufnahme durch einen Videokassettenrecorder für eine zeitversetzte Betrachtung vorprogrammiert werden, wobei der Videokassettenrecorder lediglich N Timer-vorprogrammierte Programme speichern kann,
gekennzeichnet durch die Schritte des Bereitstellens einer Fernbedienung mit einem Mittel zur Erfassung der Zeit; Eingabe von komprimiertem Code in die Fernbedienung, der jeweils wenigstens eine Ziffer besitzt, die jeweils - in längenkomprimierter Form - die Kombination von Kanal-, Tageszeit-, Tages- und Längenbefehle für ein Programm repräsentiert; und Dekodierung jedes komprimierten Codes, der wenigstens eine Ziffer für Kanal-, Tageszeit-, Tages-, und Längenbefehle aufweist; Bereitstellung eines Speichers; Eingabe der dekodierten Kanal-, Tageszeit-, Tages- und Längenbefehle in den Speicher; Umordnung der Kanal-, Tageszeit-, Tages- und Längenbefehle in dem Speicher in zeitlicher Reihenfolge; und Testen, ob die ersten N Einträge in dem Speicher sich verändert haben und - falls ja - senden der veränderten Einträge in den ersten N Einträgen zu dem Videokassettenrecorder.

47. Verfahren, bei dem einer großen Anzahl von Programmen gestattet wird, von einem Timer vorprogrammiert werden, nach Anspruch 46,
gekennzeichnet durch die folgenden Verfahrensschritte:

Periodisches Überprüfen, ob die Stopzeit des N-ten Eintrags der ersten N Einträge in dem Speicher verstrichen ist; und
falls die Stopzeit des N-ten Eintrag verstrichen ist und die Anzahl von Einträgen in dem Speicher größer als N ist, Einschalten eines Mittels zum Alarmieren des Benutzers, die Fernbedienung zu aktivieren, um mehr Programme zu dem Videokassettenrecorder zu senden und - sowie die Fernbedienung aktiviert wird - setzen der nächsten N Einträge in dem Speicher als die ersten N Einträge in dem Speicher und Senden der ersten N Einträge zu dem Videokassettenrecorder und Ausschalten des Mittels zur Alarmierung eines Benutzers.

48. System nach Anspruch 11,
dadurch gekennzeichnet, daß der Dekoder weiterhin enthält;

Ein Mittel zum Feststellen, daß die binäre Kanalprioritätszahl ein Kabelkanaleinstellbit enthält, das eine zugehörige Kabelkanalprioritätsnummer enthält; und
ein Mittel zur Benutzung der erfaßten zugewiesenen Prioritätskabelkanalprioritätsnummer zur Ableitung eines korrespondierenden lokalen Kabelkanalbefehls.

49. Verfahren nach Anspruch 48,
dadurch gekennzeichnet, daß der Schritt des Dekodierens und Expandierens weiterhin die folgenden Verfahrensschritts enthält:

Feststellen, daß die binäre Kabelprioritätszahl ein Kabelkanaleinstellbit enthält, das eine zugewiesene Kabelkanalprioritätszahl enthält; und
Benutzung der erfaßten zugewiesenen Prioritätskabelkanalprioritätsnummer, um einen korrespondierenden lokalen Kabelkanalbefehl abzuleiten.

50. ~~Verfahren nach Anspruch 39~~,
dadurch gekennzeichnet, daß der Schritt des Bereitstellens einer eindeutigen kodierten Angabe die folgenden Verfahrensschritte enthält:

Benutzung der Repräsentation, um eine Prioritätszahl für jeden der Kanal-, Datums-, Zeit- und Längenrepräsentationen abzuleiten;
Umwandlung der Prioritätszahlen in eine binäre Zahl für jeden der Kanal-, Tages-, Zeit- und Längenbefehle;
Hinzufügen eines Kabelkanalbits, das auf "1" gesetzt wird, wenn die Repräsentation für einen Kabelkanal vorgesehen ist;
Umordnung der Bits der binären Zahlen, um einen komprimierten Code von binären Bits zu erzielen; und
Umwandlung des komprimierten Codes von binären Bits in die eine eindeutige kodierte Angabe.

Revendications

1. Système pour commander automatiquement l'enregistrement par un magnétoscope à cassette (14) d'un canal de signaux vidéo sous la commande d'une instruction de canal démarrant le jour calendaire spécifié par une instruction

de jour, à l'heure du jour spécifiée par une instruction d'heure du jour, et pendant la durée spécifiée par une instruction de durée, le système comportant:

une entrée (30) pour recevoir des représentations d'indications codées, représentant chacune la combinaison de l'une de chacune desdites instructions de canal, de jour, d'heure du jour, et de durée; et
un décodeur (38) pour décoder n'importe laquelle desdites indications codées en instructions individuelles de canal, de jour, d'heure du jour, et de durée, pour commander le magnétoscope à cassette, caractérisé en ce que lesdites indications codées reçues par l'entrée, sont comprimées en longueur avant d'être reçues par l'entrée, et en ce que le décodeur (38) dilate lesdites indications codées comprimées reçues.

2. Système selon la revendication 1, caractérisé en ce que l'entrée (30) et le décodeur (38) font partie intégrante du magnétoscope à cassette.

3. Système selon la revendication 1, caractérisé par un émetteur éloigné (12) qui comprend ladite entrée.

4. Système selon la revendication 2 ou la revendication 3, comprenant un magnétoscope à cassette (14), caractérisé en ce que le magnétoscope à cassette (14) comprend un moyen de commande (36) pour interpréter si lesdites indications codées comprimées ont bien été reçues par le magnétoscope à cassette.

5. Système selon la revendication 4, caractérisé en ce que ledit moyen de commande (36) comporte un microprocesseur.

6. Système selon la revendication 1, caractérisé par un émetteur manuel éloigné (12) qui comporte ladite entrée et ledit décodeur.

7. Système selon la revendication 6, caractérisé en ce que ledit émetteur manuel éloigné comporte un contrôleur universel éloigné capable de s'adapter aux protocoles de différents contrôleurs éloignés avec lesquels interface ledit contrôleur universel éloigné.

8. Système selon la revendication 3 ou la revendication 6, dans lequel ladite entrée comporte un dispositif d'entrée au clavier.

9. Système selon la revendication 2 ou la revendication 6, caractérisé en ce que ledit décodeur (38) comporte un microprocesseur.

10. Système selon la revendication 1, caractérisé par une horloge (42) pour fournir un signal de sortie en fonction du temps, et dans lequel le décodeur (38) comporte un moyen pour générer lesdites instructions de canal, de jour, d'heure du jour, et de durée, en fonction du signal de sortie de l'horloge (42).

11. Système selon la revendication 1, caractérisé en ce que ledit décodeur comporte:

~~un moyen pour convertir ladite indication codée comprimée en un code comprimé d'éléments binaires;~~
un moyen pour ré-ordonner les éléments dudit code comprimé d'éléments binaires pour obtenir un code comprimé binaire ré-ordonné;
un moyen pour grouper ledit code comprimé binaire ré-ordonné en numéros de priorité binaires de canal, de date, d'heure du jour et de durée; et
un moyen pour utiliser lesdits numéros de priorité binaires de canal, de date, d'heure du jour, et de durée pour déterminer lesdites instructions de canal, de jour, d'heure du jour et de durée.

12. Système selon la revendication 11, caractérisé par une horloge (42) fournissant un signal de sortie en fonction du temps, et dans lequel ledit moyen pour ré-ordonner les éléments dans ledit code comprimé comporte un moyen pour ré-ordonner les éléments en fonction du signal de sortie de l'horloge (42).

13. Système selon la revendication 11, caractérisé par une horloge (42) fournissant un signal de sortie en fonction du temps, et dans lequel ledit moyen de détermination desdites instructions de canal, de jour, d'heure du jour et de durée comporte un moyen pour déterminer lesdites instructions de canal, de jour, d'heure du jour et de durée en fonction du signal de sortie de l'horloge.

14. Système selon la revendication 1, caractérisé en ce que ledit décodeur comporte:

un moyen pour convertir ladite indication codée comprimée en un code comprimé d'éléments à bases multiples;
un moyen pour ré-ordonner les éléments dans ledit code comprimé d'éléments à bases multiples pour obtenir un code comprimé à bases multiples ré-ordonné;
un moyen pour grouper ledit code comprimé à bases multiples ré-ordonné en numéros de priorité à bases multiples de canal, de date, d'heure du jour et de durée; et
un moyen pour utiliser lesdits numéros de priorité à bases multiples de canal, de date, d'heure du jour et de durée pour déterminer lesdites instructions de canal, de jour, d'heure du jour et de durée.

15. Système selon la revendication 1, caractérisé en outre par:

une horloge (42) fournissant un signal de sortie en fonction du temps;
un moyen pour comparer le jour et l'heure du jour au signal de sortie de l'horloge afin de définir une relation prédéterminée;
un sélecteur de canal pour sélectionner le canal spécifié dans l'instruction de canal après que la relation prédéterminée ait été reconnue comme existant; et
un contrôleur de marche / arrêt pour valider l'enregistrement par le magnétoscope à cassette des signaux vidéo du canal sélectionné, comportant un moyen permettant de démarrer l'enregistrement après que la relation prédéterminée a été reconnue comme existant.

16. Système selon la revendication 15, caractérisé en ce que le contrôleur comporte un moyen pour utiliser l'instruction de durée pour arrêter l'enregistrement.

17. Système selon la revendication 1, caractérisé en ce que le décodeur comporte:

un moyen pour entrer des données codées dans le décodeur (38);
un moyen pour décoder lesdites données codées pour déterminer le canal, la date, l'heure et la durée du canal des signaux vidéo à enregistrer; et
un moyen pour générer à partir desdites données codées des instructions de sélection dudit canal des signaux vidéo afin de les enregistrer, et de commande du magnétoscope à cassette pour démarrer et arrêter l'enregistrement par le magnétoscope à cassette du canal sélectionné.

18. Procédé de programmation d'un système pour commander automatiquement l'enregistrement par un magnétoscope à cassette d'un canal de signaux vidéo spécifié par une instruction de canal démarrant le jour calendaire spécifié par une instruction de jour, à l'heure du jour spécifiée par une instruction d'heure du jour, et pendant la durée spécifiée par une instruction de durée, les étapes comportant:

la réception d'indications codées, représentant chacune la combinaison de l'une de chacune desdites instructions de canal, de jour, d'heure du jour, et de durée; et
le décodage de n'importe laquelle desdites indications codées en instructions individuelles de canal, de jour, d'heure du jour, et de durée, pour commander le magnétoscope à cassette, caractérisé en ce que lesdites indications codées reçues sont des indications codées comprimées, et en ce que l'étape de décodage comporte la dilatation desdites indications codées comprimées.

19. Procédé selon la revendication 18, caractérisé par l'étape de réception de l'indication codée comprimée dans le magnétoscope à cassette.

20. Procédé selon la revendication 18, caractérisé par l'étape de réception de l'indication codée comprimée dans un émetteur éloigné du magnétoscope à cassette.

21. Procédé selon la revendication 19 ou la revendication 20, caractérisé en ce que l'étape de réception comporte l'étape d'interprétation pour déterminer si ladite indication codée comprimée a bien été reçue par le magnétoscope à cassette.

22. Procédé selon la revendication 21, caractérisé en ce que l'étape d'interprétation est réalisée par un microprocesseur.

23. Procédé selon la revendication 18, caractérisé par les étapes de réception de l'indication codée comprimée, et de décodage et dilatation de l'indication codée comprimée réalisées dans un émetteur éloigné du magnétoscope à cassette.

24. Procédé selon la revendication 18, caractérisé par l'étape d'utilisation d'un émetteur manuel éloigné qui interface avec différents contrôleurs éloignés pour s'adapter aux protocoles des différents contrôleurs.

25. Procédé selon la revendication 20 ou la revendication 23, caractérisé en ce que l'étape de réception comporte l'étape d'entrée des indications codées comprimées avec un dispositif d'entrée au clavier.

26. Procédé selon la revendication 19 ou la revendication 23, caractérisé en ce que l'étape de décodage comporte l'étape de décodage de l'indication codée comprimée avec un microprocesseur.

27. Procédé selon la revendication 18, caractérisé en ce que l'étape de décodage et de dilatation comporte l'étape consistant à réaliser ledit décodage et ladite dilatation en fonction du signal de sortie d'une horloge.

28. Procédé selon la revendication 18, caractérisé en ce que l'étape de décodage et de dilatation comporte les étapes:

de conversion de ladite indication codée comprimée en un code comprimé d'éléments binaires;
de ré-ordonnancement des éléments dans ledit code comprimé d'éléments binaires pour obtenir un code comprimé binaire ré-ordonné;
de groupement dudit code comprimé binaire ré-ordonné en numéros de priorité binaires de canal, de date, d'heure, et de durée; et
de détermination desdites instructions de canal, de jour, d'heure du jour, et de durée à partir desdits numéro de priorité binaires de canal, de date d'heure et de durée.

29. Procédé selon la revendication 28,caractérisé en ce que l'étape de ré-ordonnancement comporte l'étape de réalisation dudit ré-ordonnancement en fonction du signal de sortie d'une horloge.

30. Procédé selon la revendication 28, caractérisé en ce que l'étape de détermination comporte l'étape de réalisation de ladite détermination en fonction du signal de sortie d'une horloge.

31. Procédé selon la revendication 18, caractérisé en ce que l'étape de décodage et de dilatation comporte les étapes:

de conversion de ladite indication codée comprimée en un code comprimé d'éléments à bases multiples;
de ré-ordonnancement des éléments dans ledit code comprimé d'éléments à bases multiples pour obtenir un code comprimé à bases multiples ré-ordonné;
de groupement dudit code comprimé à bases multiples ré-ordonné en numéros de priorité à bases multiples de canal, de date, d'heure et de durée; et
de détermination desdites instructions de canal, de jour, d'heure du jour, et de durée à partir desdits numéros de priorité à bases multiples de canal, de date, d'heure, et de durée.

32. Procédé selon la revendication 18, caractérisé par les étapes de:

comparaison des instructions de jour et d'heure du jour au signal de sortie d'une horloge afin de définir une relation prédéterminée;
sélection du canal spécifié dans l'instruction de canal après que la relation prédéterminée a été reconnue comme existant; et
validation de l'enregistrement par le magnétoscope à cassette des signaux vidéo du canal sélectionné en démarrant l'enregistrement après que la relation prédéterminée a été reconnue comme existant .

33. Procédé selon la revendication 32, caractérisé par l'étape d'utilisation de l'instruction de durée pour arrêter l'enregistrement.

34. Procédé selon la revendication 18, caractérisé en ce que l'étape de décodage et de dilatation comporte les étapes:

d'entrée de données codées dans le décodeur;
de décodage desdites données codées pour déterminer le canal, la date, l'heure, et la durée des signaux

vidéo du canal à enregistrer; et
de génération, à partir desdites données codées, d'instructions pour sélectionner ledit canal des signaux vidéo, afin de les enregistrer, et pour commander le magnétoscope à cassette pour démarrer et arrêter l'enregistrement du canal sélectionné par le magnétoscope à cassette.

35. Procédé de conversion d'une liste d'émissions de télévision en une série de codes uniques, en vue d'une sélection visuelle combinée d'émissions pour un visionnement direct et pour une utilisation lors d'un enregistrement automatique d'émissions pour un visionnement ultérieur, comportant les étapes de:

création d'une section jour et d'un identificateur visuel unique de jour associé pour chacun d'une pluralité de jours calendaires;
positionnement par rapport à chacune des sections jour de l'identificateur visuel de jour associé;
création d'une section heure du jour pour chacune des sections jour, pour chacune d'une pluralité d'heures de démarrage d'émission de télévision et d'un identificateur visuel unique d'heure du jour associé;
positionnement par rapport à chacune des sections heure du jour de l'identificateur visuel unique d'heure du jour associé;
création d'une pluralité d'identificateurs visuels uniques de canal et d'un identificateur d'émission correspondant pour chacun de tels identificateurs visuels de canal, dans chaque section heure du jour pour une telle émission qui démarre à l'heure indiquée par une telle section heure du jour, et qui est associé à la section jour et à la section heure du jour dans lesquelles il est positionné.
création d'une indication codée unique pour chacune desdites émissions, l'indication codée représentant le canal, le jour calendaire, l'heure du jour, et la durée de ladite émission; et
positionnement prédéterminé par rapport à chacun des identificateurs d'émission de l'indication codée pour chacune desdites émissions, caractérisé en ce que l'étape de création de chacune desdites indications codées uniques comporte la compression de la longueur des indications codées normalement nécessaires à la programmation d'un magnétoscope à cassette.

36. Procédé selon la revendication 35, caractérisé en ce que l'étape de création d'une indication codée unique pour chacune desdites émissions comporte l'étape de:
création de l'indication codée unique de façon à avoir un nombre de chiffres inférieur à la somme des nombres de chiffres dans tous les identificateurs associés à ladite émission à laquelle s'ajoute le nombre de chiffres représentant la durée associée à ladite émission.

37. Procédé selon la revendication 35, caractérisé en ce que l'étape de création de l'indication codée unique comporte l'étape de codage de chiffres représentant les identificateurs en fonction des probabilités de la fréquence d'apparition des identificateurs dans la liste d'émissions.

38. Procédé selon la revendication 36, caractérisé en ce que l'étape de création de l'indication codée unique comporte l'étape de:
codage des chiffres dans tous les identificateurs associés à chacune desdites émissions, ainsi que des chiffres représentant la durée associée à ladite émission, en fonction des probabilités affectées au canal associé à l'identificateur de canal, au jour calendaire associé à l'identificateur de jour, à l'heure du jour associée à l'identificateur d'heure du jour et à la durée associée à ladite émission.

39. Procédé selon la revendication 35, caractérisé en ce que l'étape de création d'une pluralité d'identificateurs visuels uniques de canal comporte en outre les étapes de:

création d'au moins certains desdits identificateurs visuels de canal de façon à ce qu'ils comportent des identificateurs visuels uniques de canal câblé; et
positionnement prédéterminé par rapport à chacun desdits identificateurs visuels de canal câblé d'un numéro de canal câblé affecté représentant le canal câblé correspondant audit identificateur visuel de canal câblé pour ladite émission de télévision câblée.

40. Procédé selon la revendication 35, caractérisé en ce que l'étape de création d'une indication codée unique comporte les étapes:

de création d'une représentation séparée pour chacun des éléments de canal, de jour, d'heure du jour, et de durée pour toute émission du calendrier;

d'utilisation de ladite représentation pour déterminer un numéro de priorité pour chacune desdites représentations de canal, de date, d'heure, et de durée;
de conversion des numéros de priorité en un nombre binaire pour chacune desdites instructions de canal, de date, d'heure, et de durée;
de ré-ordonnancement des éléments desdits nombres binaires pour obtenir un code comprimé d'éléments binaires; et
de conversion du code comprimé d'éléments binaires en unedite indication codée unique.

41. Procédé selon la revendication 40, caractérisé en ce que l'étape de ré-ordonnancement comporte l'étape de réalisation dudit ré-ordonnancement en fonction d'un code binaire de hiérarchie.

42. Procédé selon la revendication 40, caractérisé en ce que l'étape de ré-ordonnancement comporte l'étape de réalisation dudit ré-ordonnancement en fonction du signal de sortie d'une horloge.

43. Procédé selon la revendication 40, caractérisé en ce que l'étape d'utilisation de ladite représentation pour déterminer un numéro de priorité comporte l'étape de réalisation d'une telle détermination en fonction du signal de sortie d'une horloge.

44. Procédé selon la revendication 35, caractérisé en ce que l'étape de création d'une indication codée unique comporte les étapes:

de création d'une représentation séparée pour chacun desdits éléments de canal, de jour, d'heure du jour, et de durée pour toute émission du calendrier;
d'utilisation de ladite représentation pour déterminer un numéro de priorité pour chacune desdites représentations de canal, de jour, d'heure, et de durée;
de conversion des numéros de priorité en un nombre à bases multiples pour chacune desdites instructions de canal, de jour, d'heure, et de durée;
de ré-ordonnancement des éléments desdits nombres à bases multiples pour obtenir un code comprimé d'éléments à bases multiples; et
de conversion du code comprimé d'éléments à bases multiples en unedite indication codée unique.

45. Procédé selon l'une quelconque des revendications 35 à 40, caractérisé en ce que chacune desdites étapes de création comporte la création sur un support de visualisation, et en ce que chacune desdites étapes de positionnement comporte le positionnement sur le support de visualisation.

46. Procédé permettant l'enregistrement pré-programmé à l'aide d'une minuterie, d'un grand nombre d'émissions par un magnétoscope à cassette pour un visionnement décalé dans le temps, dans lequel le magnétoscope à cassette ne peut enregistrer que N émissions programmées à l'aide de la minuterie, le procédé étant caractérisé par les étapes d'installation d'un contrôleur éloigné ayant un moyen d'enregistrer le temps; d'entrée dans ledit contrôleur éloigné de codes comprimés contenant chacun au moins un chiffre et représentant chacun, en longueur comprimée, la combinaison pour une émission d'instructions de canal, d'heure du jour, de jour, et de durée; et de décodage de chaque code comprimé contenant au moins un chiffre en instructions de canal, d'heure du jour, de jour, et de durée; d'installation d'une mémoire; d'entrée de chacune desdites instructions décodées de canal, d'heure du jour, de jour, et de durée dans ladite mémoire; de ré-ordonnancement dans ladite mémoire desdites instructions de canal, d'heure du jour, de jour et de durée selon l'ordre temporel; et de test pour savoir si les N premières entrées dans la dite mémoire ont été modifiées et, si oui, d'envoi audit magnétoscope à cassette des entrées modifiées parmi les N premières entrées.

47. Procédé permettant la pré-programmation à l'aide d'une minuterie d'un grand nombre d'émissions selon la revendication 46, caractérisé par les étapes:

de vérification périodique pour savoir si l'heure d'arrêt de la Nième entrée desdites N premières entrées présentes en mémoire est dépassée; et
si l'heure d'arrêt de la Nième entrée est dépassée et si le nombre d'entrées dans la mémoire est supérieur à N, de déclenchement alors d'un moyen destiné à alerter un utilisateur pour qu'il active un contrôleur éloigné afin d'envoyer plus d'émissions audit magnétoscope à cassette et, une fois que le contrôleur éloigné est activé, de désignation de N entrées suivantes dans ladite mémoire comme étant les N premières entrées dans ladite mémoire et d'envoi desdites N premières entrées audit magnétoscope à cassette, et d'arrêt dudit moyen des-

tiné à alerter un utilisateur.

48. Système selon la revendication 11, caractérisé en ce que ledit décodeur comporte en outre:

un moyen pour détecter que ledit numéro de priorité binaire de canal contient un élément binaire de canal câblé déterminé indiquant un numéro de priorité de canal câblé affecté; et
un moyen pour utiliser ledit numéro de priorité de canal câblé affecté pour déterminer une instruction de canal câblé local correspondante.

49. Procédé selon la revendication 28, caractérisé en ce que l'étape de décodage et de dilatation comporte en outre les étapes:

de détection du fait que ledit numéro de priorité binaire de canal contient un bit de canal câblé déterminé indiquant un numéro de priorité de canal câblé affecté; et
d'utilisation dudit numéro de priorité détecté de canal câblé affecté pour déterminer une instruction de canal câblé local correspondante.

50. Procédé selon la revendication 39, caractérisé en ce que l'étape de création d'une indication codée unique comporte les étapes:

d'utilisation de ladite représentation pour déterminer un numéro de priorité pour chacune desdites représentations de canal, de date, d'heure, et de durée;
de conversion des numéros de priorité en un nombre binaire pour chacune desdites instructions de canal, de jour, d'heure, et de durée;
d'ajout d'un bit de canal mis à "1" si ladite représentation correspond à un canal câblé;
de ré-ordonnancement des bits desdits nombres binaires pour obtenir un code comprimé d'éléments binaires; et
de conversion du code comprimé d'éléments binaires en unedite indication codée unique.